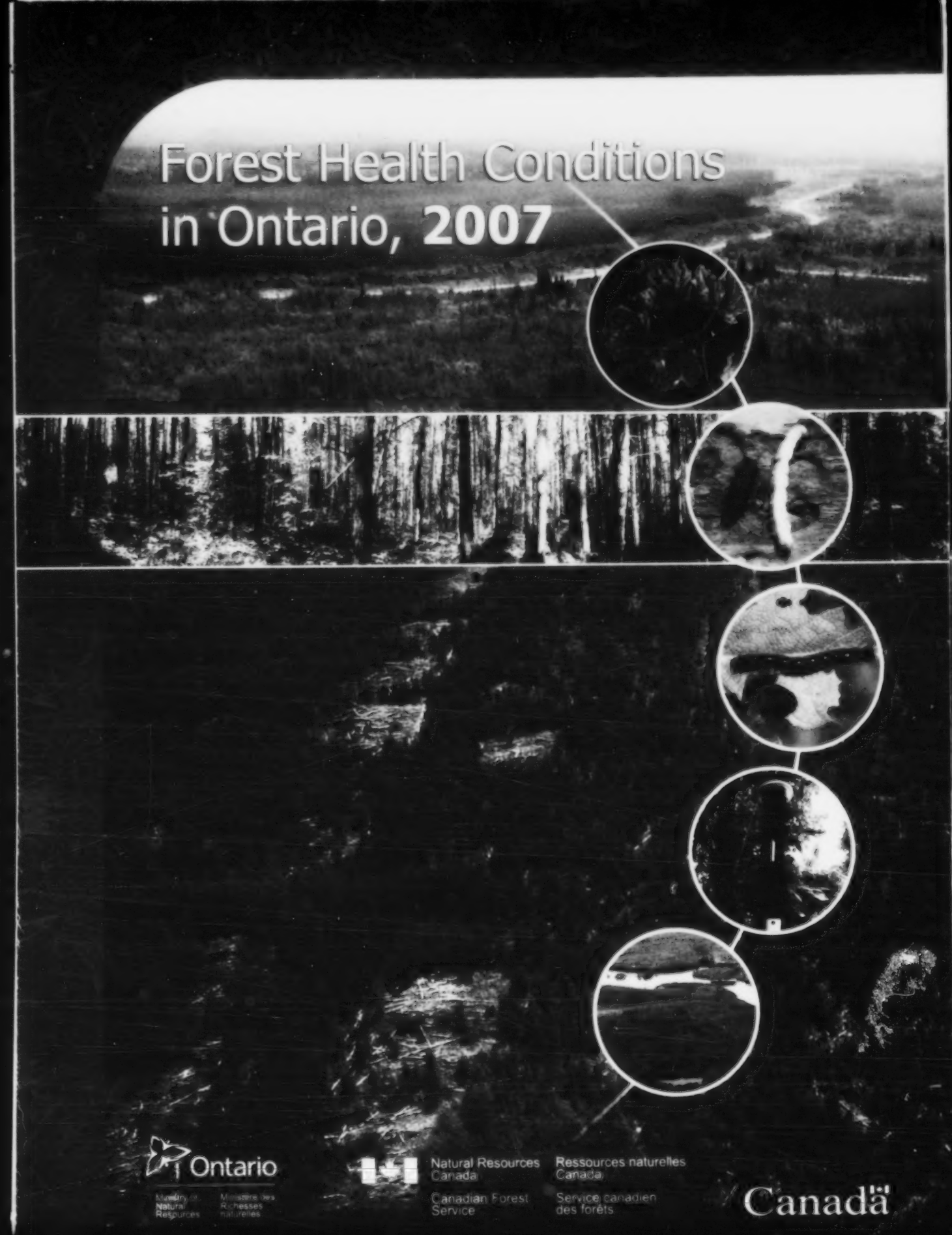
Forest Health Conditions in Ontario, **2007**



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Forest Health Conditions in Ontario, **2007**

T. Scarr[1], K. Ryall[2] and L. Thompson[1] (Editors)

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For more information on forest health in Ontario visit the Canadian Forest Service website:
www.glfc.cfs.nrcan.gc.ca

You can also visit the Ontario Ministry of Natural Resources website:
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Front cover: conifer browning caused by freezing tempertures – Hearst, Ontario.

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Forest health field surveys were performed by Ontario Ministry of Natural Resources (OMNR) and Canadian Forest Service (CFS) staff. Field staff collected forest health samples throughout the field season. These samples were submitted to technical support staff at the Canadian Forest Service, Great Lakes Forestry Centre in Sault Ste. Marie for identification.

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Additional field support provided by Dave Comba[2] and Harri Liljalehto[1].

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Introduction

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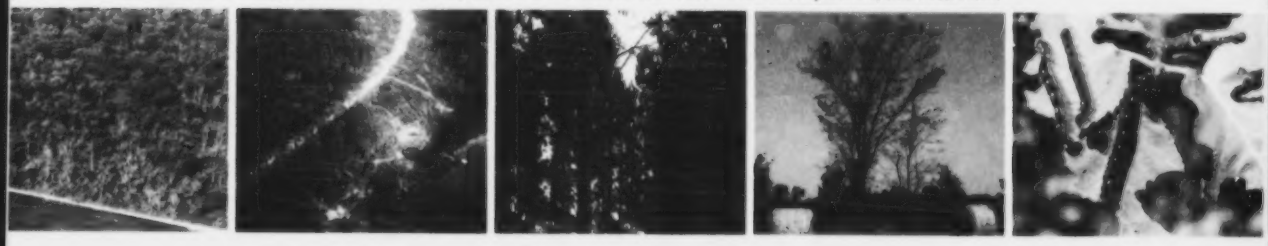

This is an annual report concerning the health of Ontario's forests as reported by staff of Ontario's Forest Health Monitoring Program in 2007.

Forest health monitoring in Ontario is conducted jointly by the Canadian Forest Service (CFS) and the Ontario Ministry of Natural Resources (OMNR) under a Memorandum of Agreement. Each agency provides six trained staff to monitor and report on forest health issues within the 12 forest health work areas covering the province of Ontario (Figure 1.1).

Through a systematic monitoring program including ground and aerial surveillance, the field staff record and report on forest health conditions and the occurrence of biotic (e.g., insect, disease) and abiotic (e.g., severe weather conditions) disturbances and events. The causal agents of these disturbances are identified through the collection of insect, disease and plant samples that are sent to the Canadian Forest Service, Great Lakes Forestry Centre for identification. Forest health updates are provided throughout the field season to client groups including forest industry, government, public and other resource stakeholders.

The results of the monitoring program are used to report on the health of Ontario's forests and the major factors affecting forest health. The information is used to develop forest pest management and forest management policy, for planning pest management programs, prioritizing and designing research projects, and to support other initiatives such as criteria and indicators of forest sustainability, biodiversity objectives, invasive species strategies and programs, and climate change programs.

For details on invasive species regulated under active operational programs led by the federal government, contact the CFIA at 1-800-442-2342 or visit their website at www.inspection.gc.ca.

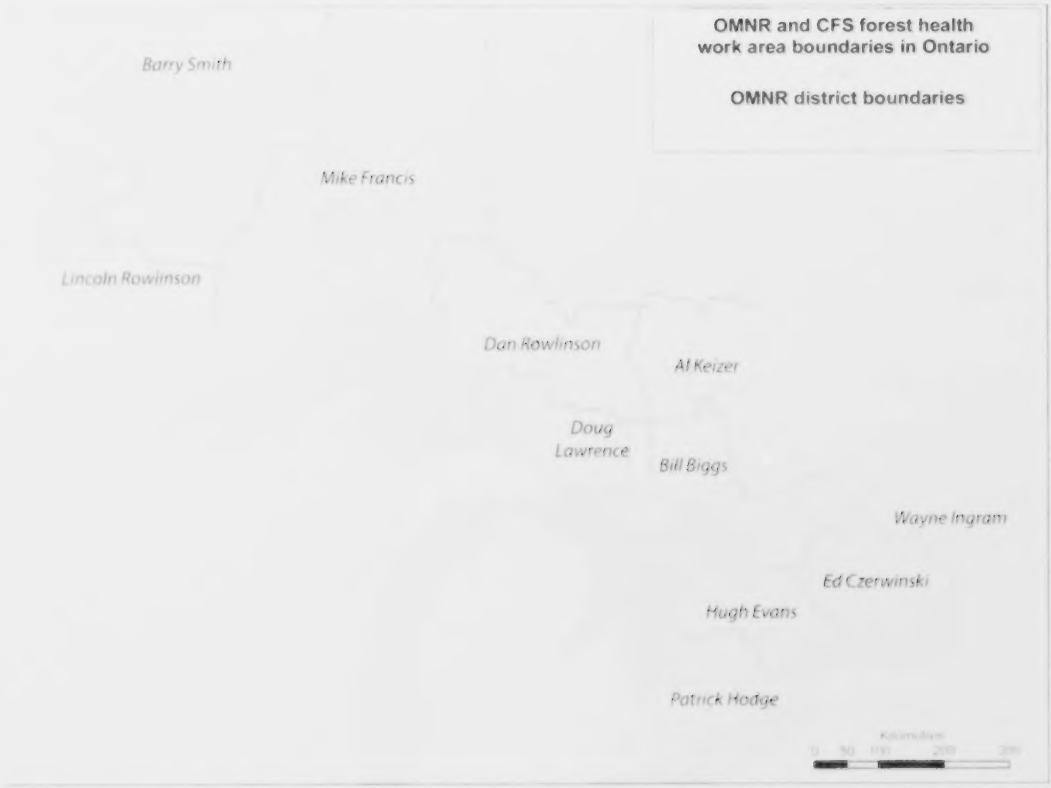

Figure 1.1 Forest health work areas in Ontario

Figure 1.2 Administrative regions and districts of Ontario

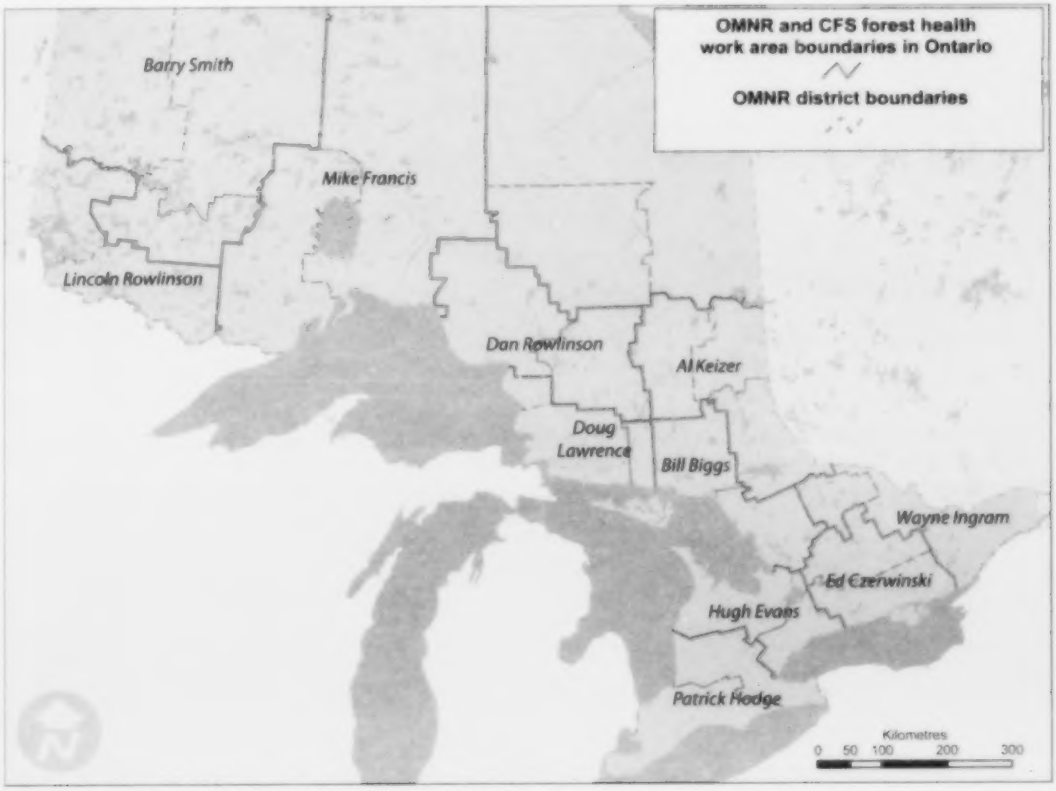

Figure 1.1 Forest health work areas in Ontario.

Figure 1.2 Administrative regions and districts of Ontario.

This report is based on the results of the 2007 monitoring program and the forest health updates. It includes major forest disturbances, invasive species and regional-level reporting on forest health issues. Major forest disturbances are caused by biotic and abiotic factors which lead to severe damage that typically spans more than one region. For the purpose of this report, the term invasive species refers to insects or pathogens that are not native to Ontario and are currently causing, or are likely to cause environmental or socio- or economic harm.

This report uses the administrative regions of OMNR: Northwest Region, Northeast Region and Southern Region (Figure 1.2).

Several forest health events occurred in the province in 2007. The jack pine budworm outbreak, which began in 2004 continued its pattern of collapsing in one area after about 2 years of defoliation, while increasing in other areas that had not yet been defoliated during the current outbreak. Jack pine budworm defoliation forecasts for 2008 indicate only a few areas will undergo moderate-to-severe defoliation whereas the overwhelming majority of the province can expect light to no defoliation in 2008.

Invasive species continue to pose problems to forest health. There was an expansion in the range of the emerald ash borer, which was found in Toronto in October of 2007. A cool wet spring created favourable conditions for diseases such as anthracnose, shoot blight of aspen, and a variety of rusts. Further weather anomalies in winter and spring 2007 also led to the browning of 346,080 ha of conifers in Northeast Region. Other significant forest health issues include severe winds in northwestern Ontario that caused over 17,000 ha of blowdown, and an increasing gypsy moth population in southern Ontario.

There are many forest pests not described in this report that may have affected Ontario's forests in 2007 or in previous years. Information on certain pests may be omitted if insignificant population or damage levels occurred in 2007, or they occurred at a very small spatial scale, or if identification of the pest had not yet been verified.

Pests reported within each chapter are listed in alphabetical order by scientific name. An index has also been included at the end of the report for easy reference.

Major Forest Disturbances

M. Francis[1], D.T. Rowlinson[1], L. Rowlinson[1], H.J. Evans[2], A.J. Keizer[2] and E.J. Czerwinski[1]

[1] *Ontario Ministry of Natural Resources, Forest Management Branch, Forest Health & Silviculture Section, Sault Ste Marie*
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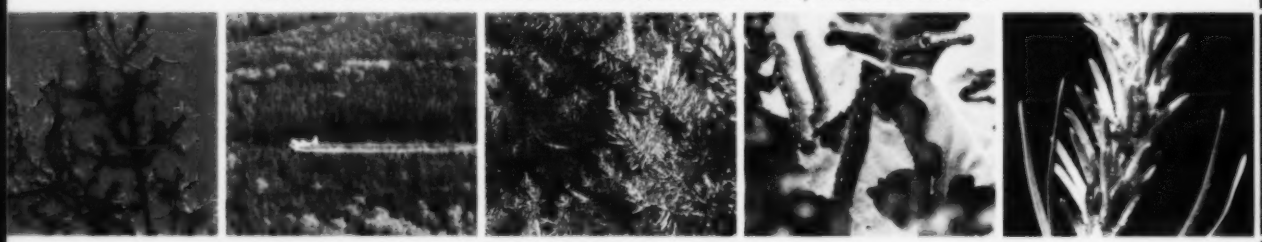
SECTION 2



FOREST INSECTS

Large aspen tortrix, *Choristoneura conflictana (Wlk.)*

This insect is considered to be the second most significant defoliator of trembling aspen (*Populus tremuloides* Michx.) throughout the natural range of this host species. Only the forest tent caterpillar (*Malacosoma disstria* Hbn) affects larger areas during an outbreak. Folding and tying of the foliage by the tortrix gives affected trees a very thin, ragged-looking crown. Although this species prefers trembling aspen, it will also feed on poplar (*Populus* spp.), willow (*Salix* spp.), cherry (*Prunus* spp.) and alder (*Alnus* spp.) during times of population outbreak. In 2007, aerial surveys conducted during late June and early July by CFS/OMNR forest health technicians recorded 81,947 ha of moderate-to-severe large aspen tortrix defoliation across the province (Table 2.1 and Figure 2.1).

Most of the 2007 defoliation occurred in Northwest Region where 78,650 ha of defoliation were mapped in Kenora and Red Lake districts. The majority of the 47,483 ha infestation in Kenora District occurred along the Winnipeg River system from the town of Minaki in the southeast corner, through the Islington First Nations reserve to the northern shore of Tetu Lake. The southern boundary ran along the CN Railway line in Rice Township with the western boundary stretching beyond the provincial border of Ontario and into Manitoba. Small pockets of defoliation were also mapped to the northeast of this large area along the southern shore of Rex Lake and along the northern shore of Sturgeon Lake, both within the English River system. The 2007 infestation in Kenora District was nearly double the area mapped in 2006 (23,681 ha) in Kenora District.

Region District	Area of defoliation (ha) 2004	2005	2006	2007
Northwest				
Kenora	0	0	23,681	47,483
Red Lake	0	0	1,076	31,167
Subtotal	0	0	24,757	78,650
Southern				
Bancroft	3,987	3,997	0	0
Parry Sound	256	2,364	5,937	3,297
Pembroke	2,338	1,412	0	0
Subtotal	6,581	7,773	5,937	3,297
TOTAL	6,581	7,773	30,694	81,947

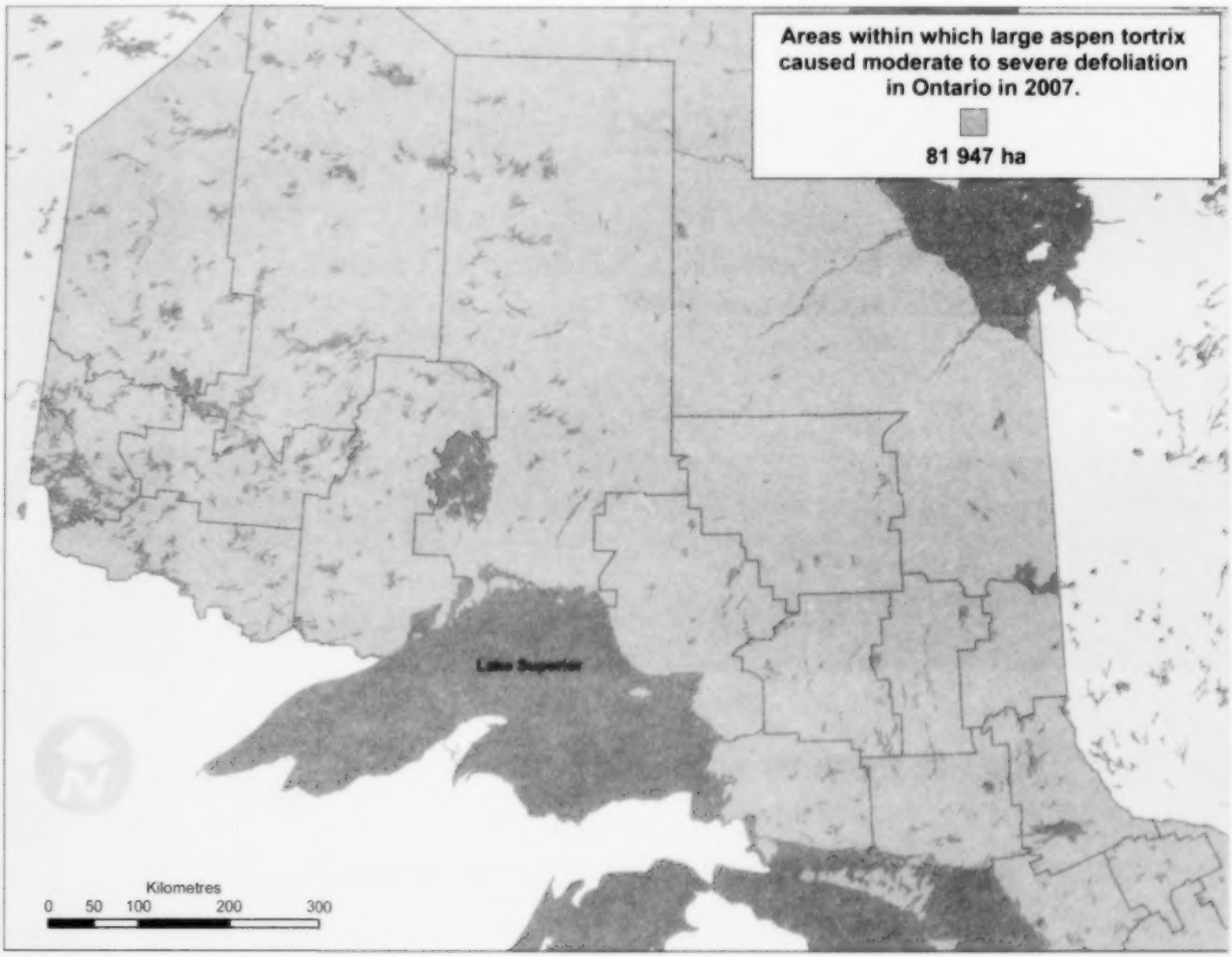


Figure 2.1 Areas-within-which large aspen tortrix caused moderate-to-severe defoliation in Ontario, 2007

Table 2.1 Gross area of moderate-to-severe defoliation caused by large aspen tortrix in Ontario from 2004-2007

Region / **District**	**Area of defoliation (ha)** 2004	2005	2006	2007
Northwest				
Kenora	0	0	23,681	47,483
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Sub total	0	0	24,757	78,650
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Bancroft	3,987	3,997	0	0
Parry Sound	256	2,364	5,937	3,297
Pembroke	2,338	1,412	0	0
Sub total	6,581	7,773	5,937	3,297
TOTAL	6,581	7,773	30,694	81,947

Defoliation by large aspen tortrix was also mapped in the southwest corner of Red Lake District on the southern shore of Sydney Lake and on the northwest side of the district near the community of Pikangikum. Total defoliation in the Red Lake District was 31,167 ha. This was a substantial increase from the 1,076 ha mapped in 2006.

In the Southern Region, scattered pockets of defoliated trembling aspen were recorded near Burk's Falls between Doe Lake and Emsdale, as well as in the Katrine area, Parry Sound District. The total area affected was 3,297 ha, a reduction from the 5,937 ha mapped in 2006. Low populations of the tortrix were also recorded in Monteagle, Carlow and Dungannon townships in Bancroft District.

Spruce budworm, *Choristoneura fumiferana (Clem.)*

The spruce budworm continues to cause significant defoliation within the forests of Ontario (Figure 2.2, 2.3 and 2.4). Severe defoliation of white spruce (*Picea glauca* Monech Voss.), black spruce (*Picea mariana* Mill. BSP) and balsam fir (*Abies balsamea* L.) has expanded in all directions for the third consecutive year in the North Bay District (Figure 2.5 and Table 2.2). Defoliation continued to increase and reached 849,000 ha in 2007. Figure 2.7 shows spruce budworm defoliation in Ontario since 1950.

Figure 2.2 Spruce budworm larvae feeding on spruce in northeastern Ontario (photo by D. Rowlinson)

Damaged host trees were visible along the Parry Sound District border following the French River water system in an easterly direction to the Town of Trout Creek. Large pockets of defoliation were observed around the City of North Bay and north of the Mattawa River in Olrig and Phelps townships, and south of the Town of Bonfield in Bolter and Lauder townships. To the north, larval feeding and subsequent host tree defoliation was observed north of the City of North Bay east to McLarens Bay on the Temiskaming River and north to Cobalt.

Moderate-to-severe defoliation, as well as top and whole tree mortality of balsam fir and white spruce (Figure 2.6) was noted at the southern end of Lake Temagami in Vogt, Torrington, Hobbs and McCallum townships and on the southern islands of the south western arm of Lake Temagami.

The infestation mentioned above in North Bay District in 2007, was also reported in Sudbury District extending further west to include numerous pockets of moderate-to-severe defoliation along the west side of Hwy. 69 as far as Kilpatrick Township and north of Hwy. 17 in Street Township. Defoliated mixed stands of spruce and fir were also detected in Kelly, McCarthy and Sheppard townships. A major expansion was recorded for the Walden area infestation that first appeared in 2005. Damage is now present further north to Dowling and Chelmsford with a few satellite areas detected south between Hwy. 17 and Lake Panache. The infestation in Mowat and Blair townships that was first observed in 2006 continues to persist, however, in 2007 a slight decrease in the area infested was recorded.

Similar to the mortality reported in the Lake Temagami area, whole tree mortality of balsam fir and white spruce was found along the eastern Sudbury District boundary within the townships of Hagar, Ratter, Appleby, Dunnet and Casimir.

Defoliation continued to persist across Sault Ste. Marie District where 7,405 ha were reported primarily in the Kirkwood Forest. This represents an increase of 4,155 ha since 2006.

Districts across the southern portion of the province reported significant decreases in defoliation for 2007, as unusual cold and wet spring weather appears to have had an adverse affect on budworm populations. This was apparent during spring surveys when numerous dead larvae were noted in the newly developed shoots of spruce and fir trees. In Algonquin Park the infestation was once again confined to an area south of Gibson Lake in the townships of Biggar and Paxton. A smaller area of damage was also recorded near Axton Lake in Paxton Township.

In the Pembroke District, the most severe defoliation persisted in Stafford and Alice townships close to the Town of Locksley. East of this area, defoliation was also noted in four small pockets near Kathmae Siding and Meath in Pembroke and Westmeath townships. Along the Ottawa River, defoliation persisted at three locations near Grants Settlement and McLarens Settlement in Ross Township. Defoliation was also recorded adjacent to Hwy. 17 along the Bonnechere Ridge from Cobden to Chenaux and then again from Renfrew to Braeside. The largest area of damage continues to persist in Admaston and Bromely townships. Within these townships defoliation encompasses the towns of Douglas and McDougall, continuing along Hwy. 132 northeast to the Hamlet of Ferguslea. As in the heavily defoliated areas in the northeastern portion of the province, balsam fir and white spruce are succumbing to consecutive years of defoliation and whole tree mortality has been observed.

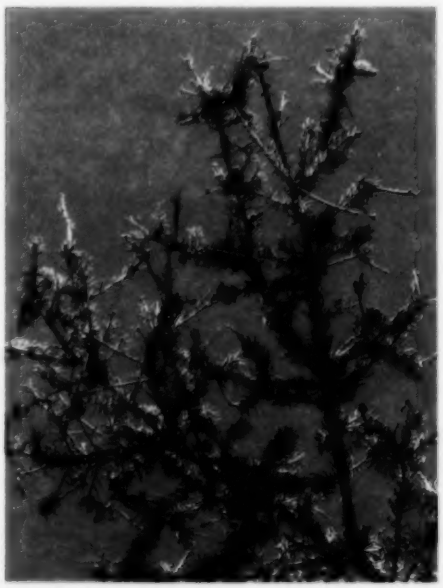


Figure 2.3 White spruce branch, severely defoliated by spruce budworm (photo by W. Ingram)

Figure 2.4 Defoliation by spruce budworm (photo by D. Rowlinson)

Table 2.2 Gross area of moderate-to-severe defoliation caused by spruce budworm in Ontario from 2004–2007

Region / District	Area of defoliation (ha) 2004	2005	2006	2007
Northwest				
Kenora	138	209	0	0
Sub total	138	209	0	0
Northeast				
North Bay	187 854	250 936	690 731	714 358
Sault Ste. Marie	0	302	3 250	7 405
Sudbury	40 448	47 768	72 739	111 380
Sub total	228 302	299 006	766 720	833 143
Southern				
Algonquin	0	0	0	1 994
Bancroft	6 675	0	0	0
Kemptville	11 381	9 238	6 341	4 469
Parry Sound	0	0	2 796	2 217
Pembroke	32 858	28 988	21 349	7 222
Peterborough	470	44	0	0
Sub total	51 384	38 270	30 486	15 902
TOTAL	279 824	337 485	797 206	849 045

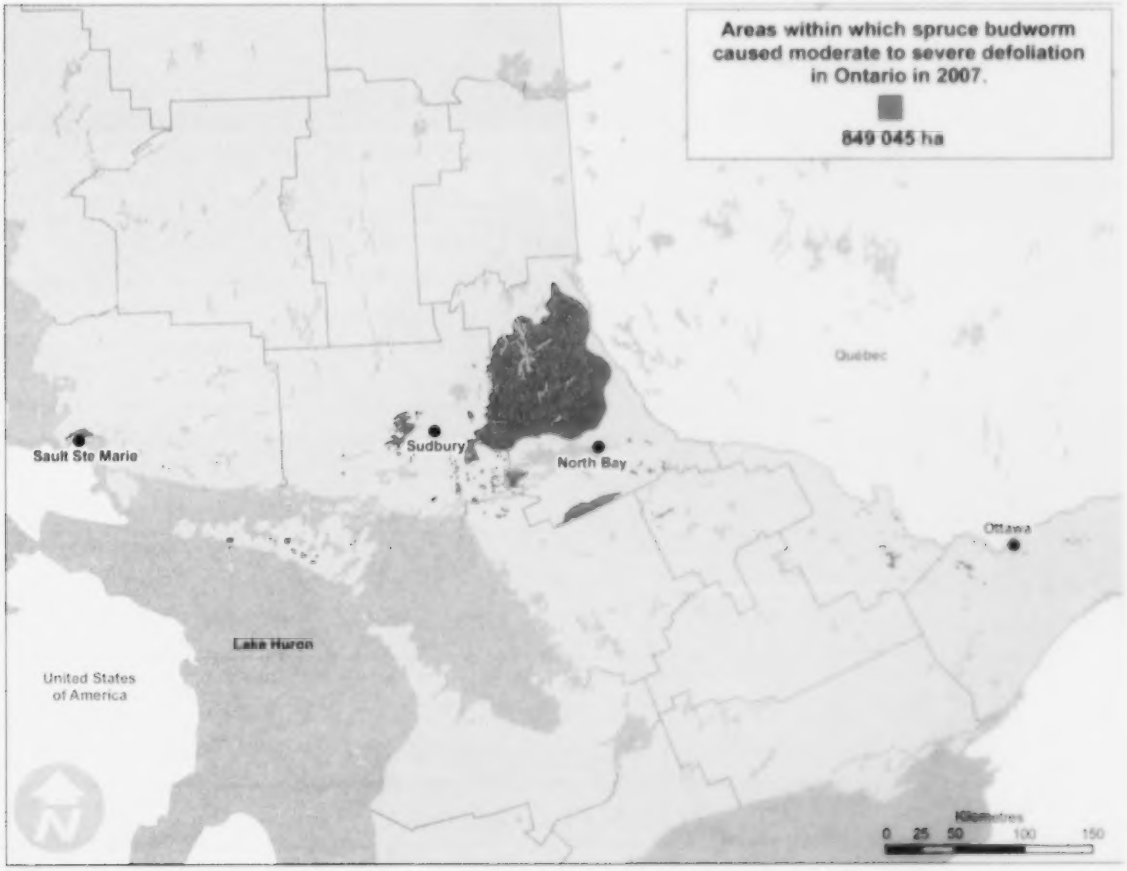
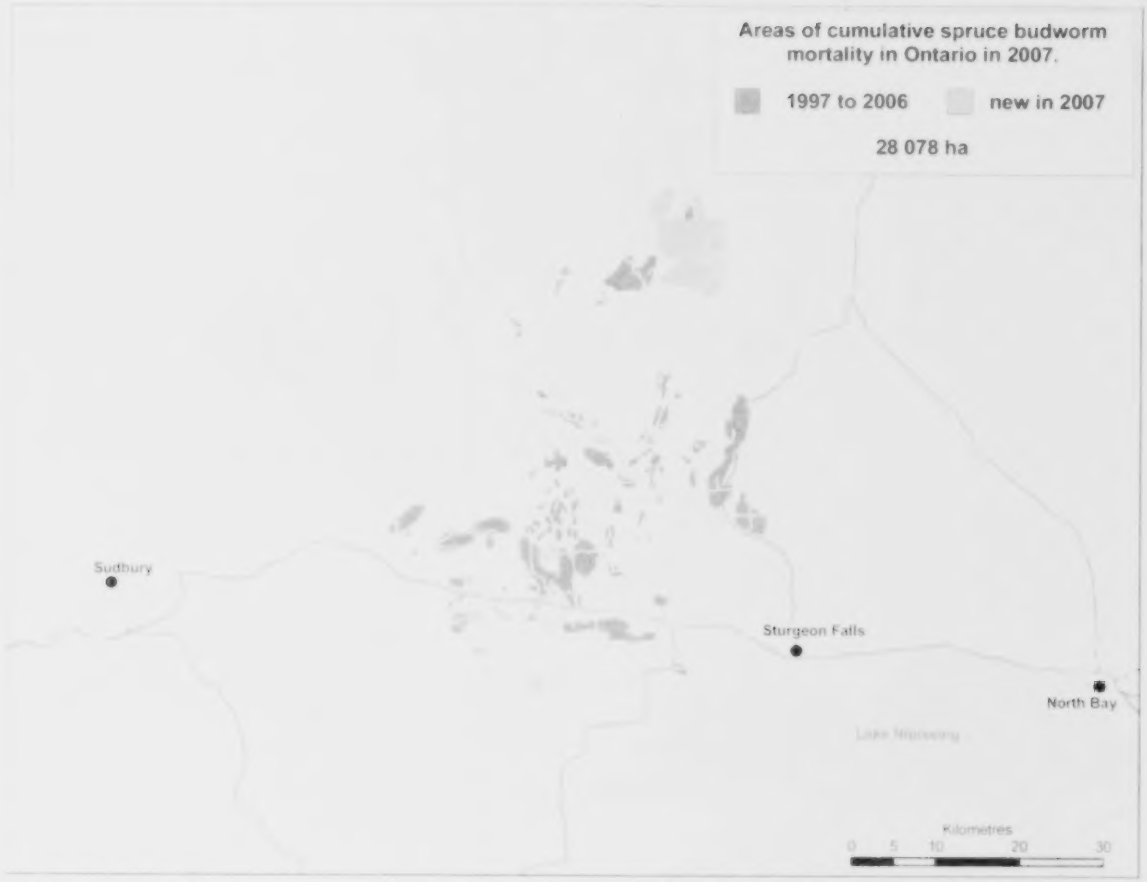


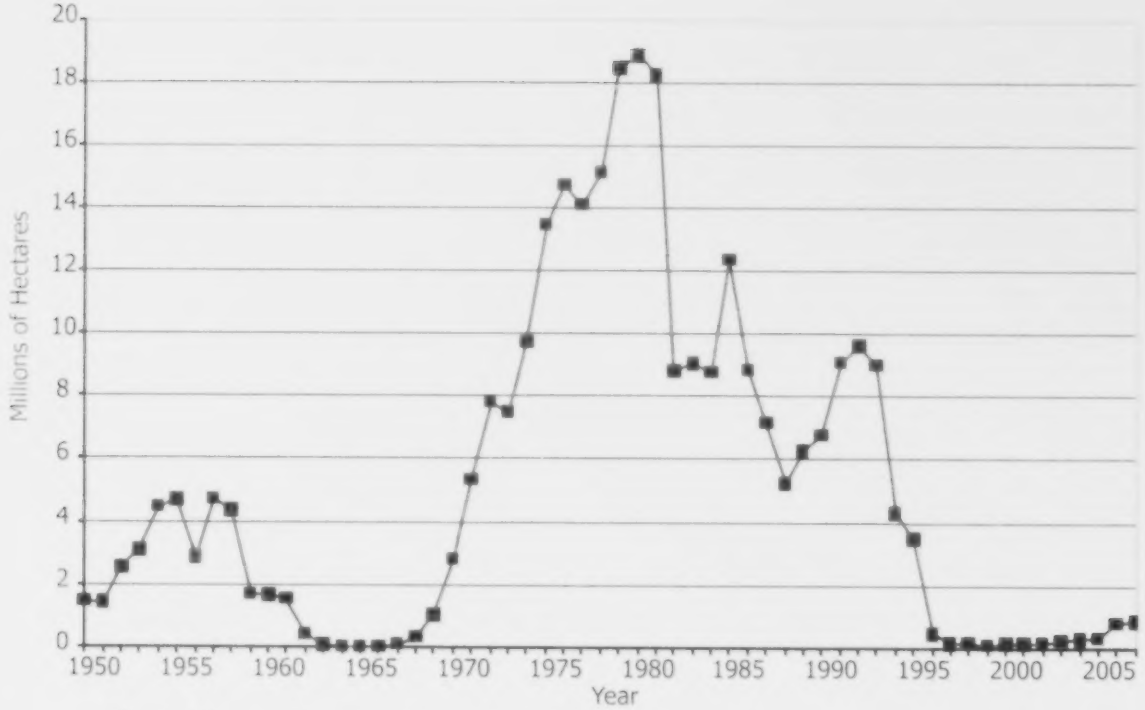
Figure 2.5 Areas-within-which spruce budworm caused moderate-to-severe defoliation in Ontario, 2007

Region	Area of defoliation (ha)			
District	2004	2005	2006	2007
Northwest				
Kenora	138	209	0	0
Subtotal	138	209	0	0
Northeast				
North Bay	187 854	250 936	690 731	714 358
Sault Ste. Marie	0	302	3 250	7 405
Sudbury	40 446	47 768	72 739	111 380
Subtotal	228 182	299 006	766 720	833 143
Southern				
Algonquin	0	0	0	1 994
Bancroft	6 675	0	0	0
Kemptville	11 582	9 238	8 341	4 469
Parry Sound	0	0	2 796	2 217
Pembroke	32 868	28 988	23 349	7 222
Peterborough	170	44	0	0
Subtotal	51 364	38 270	30 486	15 902
TOTAL	279 824	337 485	797 206	849 045

Areas within which spruce budworm caused moderate to severe defoliation in Ontario in 2007

849 045 ha


Areas of cumulative spruce budworm mortality in Ontario in 2007.
1997 to 2006
new in 2007
28 078 ha
Sudbury
Sturgeon Falls
North Bay
Lake Nipissing
Kilometres
0 5 10 20 30


Millions of Hectares
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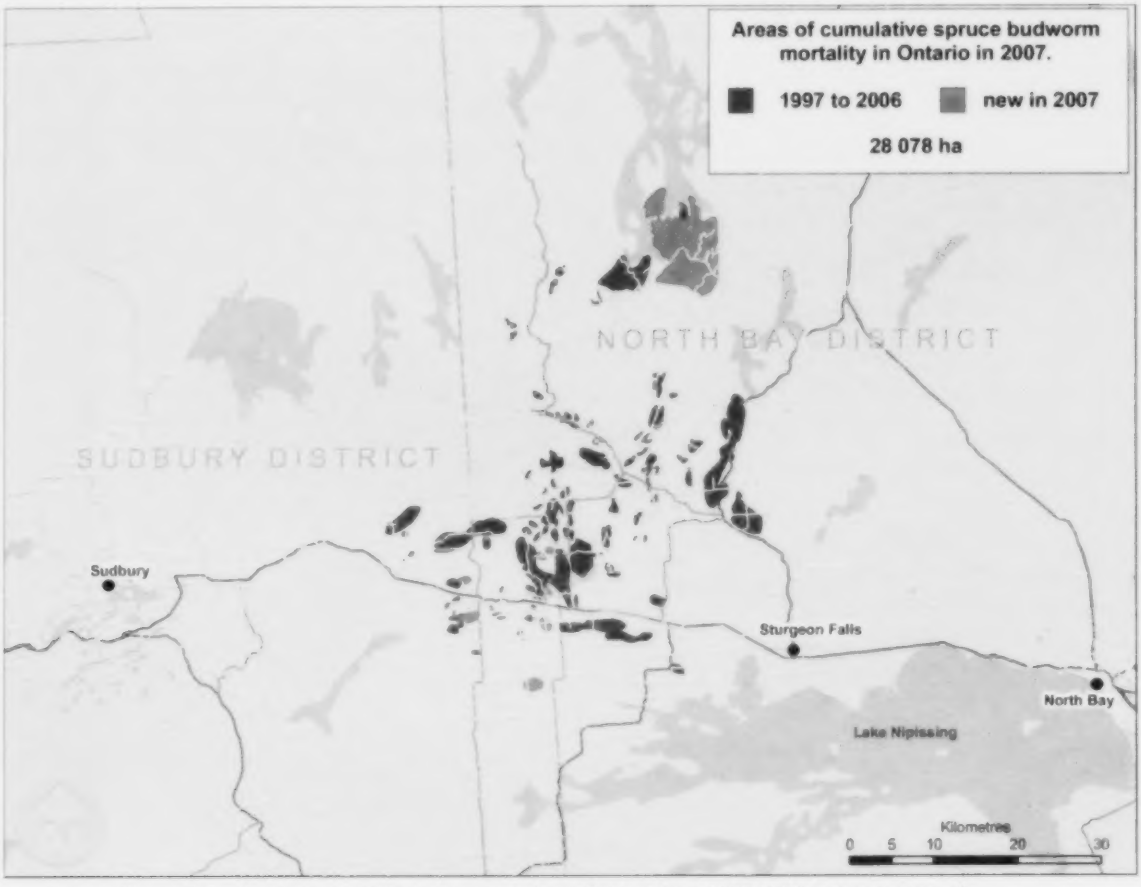

Figure 2.6 Areas of spruce budworm mortality in Ontario from 1997-2006 and new areas of mortality for 2007

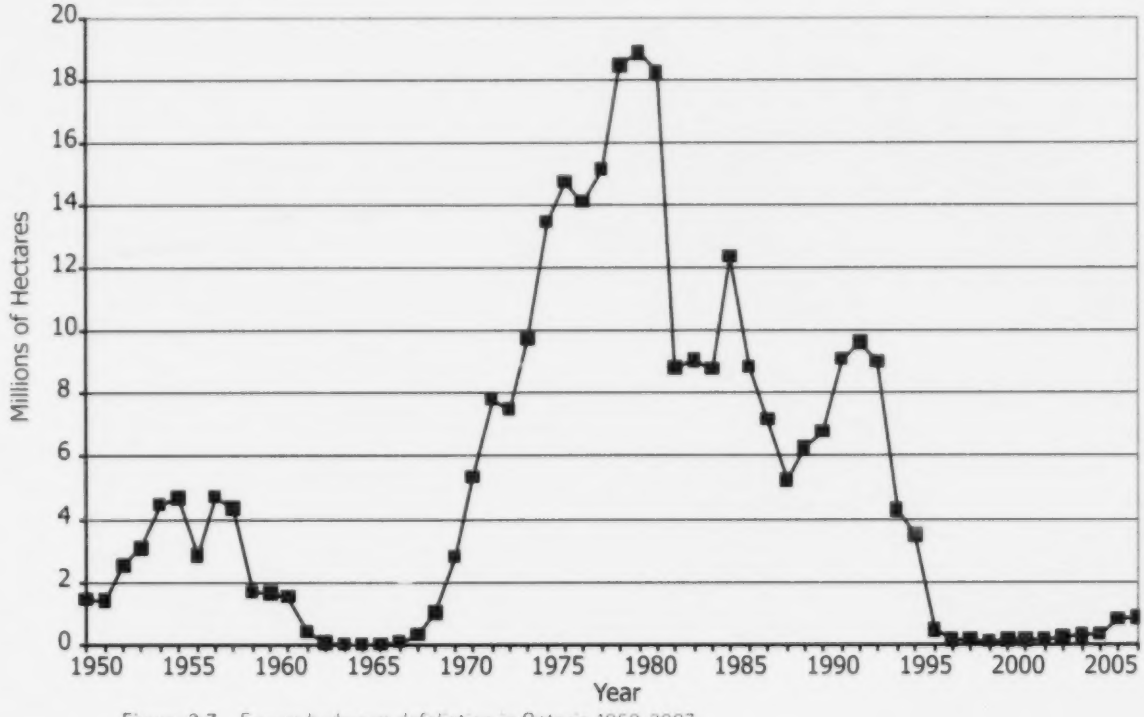

Figure 2.7 Spruce budworm defoliation in Ontario 1950-2007.

Previous years of heavy defoliation in the Kemptville District have also resulted in whole tree mortality of mainly white spruce south of the Town of Arnprior in Packenham Township. Adjacent to the Ottawa River, small areas of defoliation were recorded at Woodridge, MacLarens Landing and near Constance Bay adjacent to Dwyer Hill Road and Hwy. 17. In the vicinity of Ottawa, moderate defoliation was noted in white spruce plantations along Davidson, White and Leitrim roads. Defoliation still persists in the LaRose Forest despite a reduction in intensity. Areas still affected include the plantations surveyed along Clarence and Cambridge roads in the vicinity of the LaRose Forest headquarters. White spruce plantations south of the boundary road are in very poor shape with heavy tree mortality. Two additional pockets were mapped east of Hwy. 8 in South Plantagenet Township.

Jack pine budworm, *Choristoneura p. pinus* Free.

This native insect undergoes periodic outbreaks approximately every 10 years. The outbreaks are characterized by abrupt population increases, severe defoliation, and rapid population collapses. While the outbreak may last 4 or more years, individual stands are typically defoliated for only about 2 years. Collapse of the population is thought to be caused by a combination of a shut down in male flower production by defoliated trees, increased disease, and parasitism.

Figure 2.8 Jack pine budworm on jack pine (photo by M. Francis)

For the fourth consecutive year this destructive pest was recorded defoliating jack pine (*Pinus banksiana* Lamb.) stands in Ontario (Figure 2.8). In 2007, this insect caused a total of 536,051 ha of defoliation province-wide (Figure 2.9), compared to 720,172 ha in 2006 (Table 2.3). A large decline was recorded in Northwest Region, while modest increases were documented in Northeast and Southern regions. Figure 2.10 shows jack pine budworm defoliation in Ontario since 1950.

In Northwest Region, aerial surveys revealed a significant decrease in areas of moderate-to-severe jack pine budworm defoliation in 2007. Aerial spray programs in 2006 and 2007 reduced the amount of area defoliated. In 2007, though, a cool, wet spring with many days of heavy rain hampered budworm development and likely resulted in significant larval mortality. The heavy rains also made aerial mapping difficult by washing away the partly chewed needles and insect frass which dry out and give the trees a red appearance.

In Fort Frances District, the area of jack pine budworm defoliation declined from 355,134 ha in 2006 to 41,020 ha in 2007, representing a drop of almost 315,000 ha. The largest area of defoliation was aerially mapped on the eastern boundary of Quetico Provincial Park. Smaller pockets of defoliation were also recorded within Turtle River Provincial Park along the boundary of Fort Frances and Dryden districts (Hwy. 622).

Kenora District also experienced lower levels of jack pine budworm defoliation. The affected area dropped from 355,747 ha in 2006 to 227,210 ha in 2007. The majority of the moderate-

Table 2.3 Gross area of moderate-to-severe defoliation caused by jack pine budworm in Ontario, 2004-2007

Region District	Area of defoliation (ha) 2004	2005	2006	2007
Northwest				
Dryden	0	1,983	116,195	178,881
Fort Frances	0	85,328	355,134	41,020
Kenora	0	1,134	248,843	227,210
Red Lake	0	0	0	6,783
Sioux Lookout	0	0	0	9,065
Thunder Bay	0	0	0	892
Subtotal	0	88,445	720,172	463,851
Northeast				
North Bay	0	0	0	306
Sault Ste Marie	0	953	951	2,502
Sudbury	851	2,599	14,038	42,775
Timmins	0	0	0	4,228
Subtotal	851	3,552	14,989	49,811
Southern				
Algonquin	0	0	0	185
Parry Sound	0	0	4,548	21,674
Pembroke	0	222	407	530
Subtotal	0	222	4,955	22,389
TOTAL	851	92,219	740,116	536,051

to-severe defoliation occurred in the central part of the district stretching from Vermillion Lake, north of the Town of Kenora, to the eastern boundary of the district, just east of Hwy. 105. Several satellite pockets of moderate-to-severe defoliation were also scattered in the north end of the district in the Lennan Lake area and between Maynard and Aerobus Lake, northeast of Grassy Narrows.

Dryden District had the largest increase in area of defoliation from 116,195 ha in 2006 to 178,881 ha in 2007. Most of the defoliation was recorded in the northwest portion of the district, north of the towns of Dryden and Vermillion Bay. Defoliation was seen up to the southern edge of Lac Seul and in the Gordon Lake area near the northwest boundary of the district. Several smaller pockets were mapped in the central portion of the district from the Village of Dinorwic to the Town of Ignace.

Red Lake District had no jack pine budworm defoliation in 2006. In 2007 though, 6,783 ha of moderate-to-severe defoliation were recorded in the southern part of the district. The largest pocket of defoliation was recorded on the south shore of Sydney Lake. Several smaller pockets were also reported west of the Town of Ear Falls, on the south end of Pakwash Lake and the east side of Sumac Lake.

A new infestation was also detected in Sioux Lookout District in 2007. This new 9,065 ha infestation was aerially mapped between Whitefish and Clear lakes on the south shore of Lac Seul and at Wapesi Lake on the western side of the district.

Thunder Bay District sustained 892 ha of moderate-to-severe defoliation, with the majority occurring in the southwest portion of the district in the Batwing, Greenwater and Titmarsh Lake areas.

In Northeast Region, there was an increase from 14,989 ha of jack pine budworm defoliation in 2006 to 49,989 ha in 2007. Sudbury District posted the greatest increase from 14,038 ha in 2006 to 42,775 ha in 2007. New pockets of moderate-to-severe defoliation were mapped to the north and east of Lake Wanapitei. On the west side of Lake Wanapitei there was an expansion of an area defoliated in 2005 and 2006. Other areas previously defoliated in 2006 in the Sudbury District also expanded in 2007. Infestations continued to spread in Merritt (Town of Espanola) and Nairn townships along the Hwy. 17 corridor. This trend was seen north of the town of Espanola at Agnew Lake and south of town in the Great La Cloche Island, Whitefish Falls and La Cloche Peninsula areas.

A new infestation was mapped in Timmins District consisting of 4,228 ha of moderate-to-severe defoliation located south of the Town of Gogama along the Hwy. 560 corridor between the CN Railway line and Hwy. 144.

Sault Ste. Marie District increased to 2,502 ha of moderate-to-severe defoliation in 2007, up from 951 ha in 2006. General expansions were observed in areas previously infested in 2005 and 2006. The infestation in Sagard Township, northeast of the Town of Elliot Lake spread slightly whereas the infestation in Mack Township, north of the Town of Blind River did not

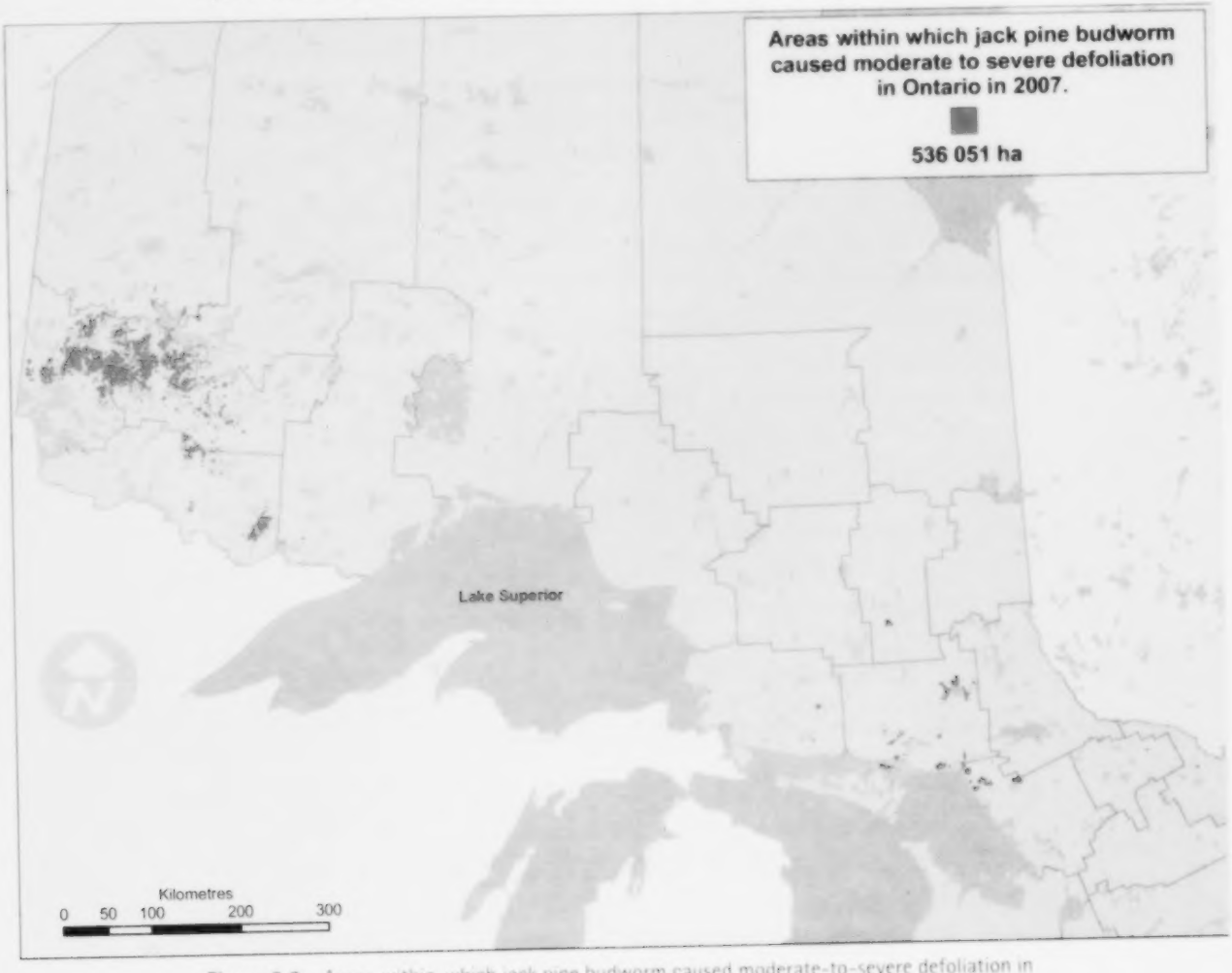

Figure 2.9 Areas-within-which jack pine budworm caused moderate-to-severe defoliation in Ontario, 2007

In Northeast Region, there was an increase from 14,989 ha of jack pine budworm defoliation in 2006 to 49,989 ha in 2007. Sudbury District posted the greatest increase from 14,038 ha in 2006 to 42,775 ha in 2007. New pockets of moderate-to-severe defoliation were mapped to the north and east of Lake Wanapitei. On the west side of Lake Wanapitei there was an expansion of an area defoliated in 2005 and 2006. Other areas previously defoliated in 2006 in the Sudbury District also expanded in 2007. Infestations continued to spread in Merritt (Town of Espanola) and Nairn townships along the Hwy. 17 corridor. This trend was seen north of the town of Espanola at Agnew Lake and south of town in the Great La Cloche Island, Whitefish Falls and La Cloche Peninsula areas.

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Figure 2.9

spread and was less intense this year. A new pocket of jack pine budworm defoliation was mapped in the south section of Rose Township between the community of Rydal Bank and Hwy. 129, north of the Town of Thessalon.

A new pocket of moderate-to-severe defoliation (306 ha) was mapped in North Bay District in the south west corner of East Mills Township, south of the Town of Loring along Hwy. 522.

In Southern Region, the area of moderate-to-severe defoliation increased significantly from 4,955 ha in 2006 to 22,389 ha in 2007. Parry Sound District had the largest increase in this region jumping from 4,548 ha in 2006 to 21,674 ha in 2007. Much of the increase can be attributed to the expansion of areas previously defoliated in 2006 along both sides of Hwy. 69 near the Town of Britt and Byng Inlet. New satellite pockets of moderate-to-severe defoliation were reported between the French and Key rivers, Henvey Township (west of Still River) and along the North Bay/Parry Sound District border.

In Pembroke District and Algonquin Park, moderate-to-severe damage increased modestly from 407 ha in 2006 to 530 ha of in 2007.

For the third consecutive year the jack pine budworm infestation persisted in Fraser Township (Pembroke District), but defoliation was not as severe as in previous years. Also in Pembroke District, a new area of defoliation was detected in the vicinity of Bonnechere Airport in Richards Township. Young jack pine trees (12 m tall) near the runway suffered moderate-to-severe defoliation.

In Algonquin Park, a new area of defoliation was also found close to Lake Traverse. Defoliation was on young jack pine trees which were located on a knoll near the old observatory. Upon ground checks, low levels of jack pine budworm defoliation were also found on surrounding red pine (*Pinus resinosa* Ait.) and eastern white pine (*P. strobus* L.).

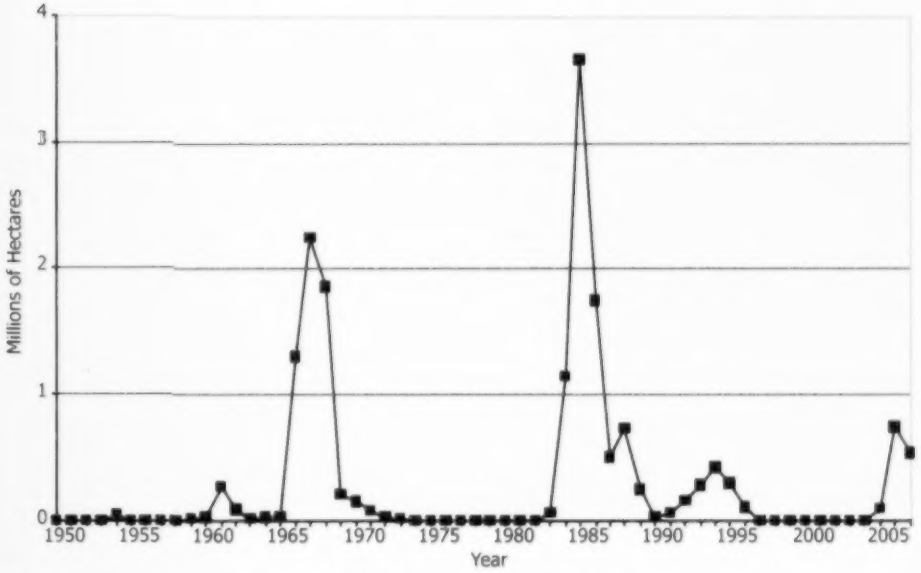


Figure 2.10 Jack pine budworm defoliation in Ontario 1950-2007.

Jack pine budworm spray program

For the second consecutive year, an insect pest management program was carried out in Northwest Region. The program was developed by an interdisciplinary team comprised of OMNR district, regional and Forest Management Branch staff, representatives of the sustainable forest licensees and representatives of the local citizens committee. The majority of the program consisted of an insecticide spray program using the biological insecticide *Bacillus thuringiensis* var. *kurstaki* [*Btk*]. The larvae of the jack pine budworm must ingest the *Btk* on the jack pine needles for the insecticide to be effective.

The 2007 jack pine budworm aerial spray program was conducted over three project areas: Atikokan, Kenora, and Dryden. Number of blocks sprayed, areas treated and volumes sprayed are summarized in Table 2.4. In Atikokan, spraying began on June 5 and finished on June 12. In Kenora, spraying began on June 3 and finished on June 16. In Dryden, spraying began on June 5 and finished on June 14. A single application of the biological insecticide Foray 76B (*Bacillus thuringiensis* var. *kurstaki* [*Btk*]), was applied over 172,413 ha at a rate of 30 BIU/1.5L/ha.

Table 2.4 Project areas, number of spray blocks, area treated and volume sprayed for the 2007 jack pine budworm aerial spray program in Ontario

Project area	Number of spray blocks	Area treated (ha)	Volume of *Btk* sprayed (L)
Atikokan	408	42,239	63,839
Kenora	506	70,796	106,194
Dryden	476	59,378	86,692
TOTAL	1,390	172,413	256,725

The goal of the spray 2007 program was foliage protection: keep defoliation below 40% to maintain tree health and reduce tree mortality and top-kill until natural factors bring about a collapse of the population. Spray deposit sampling and defoliation assessment showed the program was successful in limiting defoliation and keeping the trees healthy. Unlike 2006, larval populations just prior to spraying in most sites were not as high, and were reduced even further by the heavy spring rains. Overall defoliation in the sprayed areas averaged 17%, while the control (unsprayed) areas had an average of 42% defoliation (Figure 2.11). In the Atikokan project area, jack pine budworm defoliation in the sprayed area reached 15%, while defoliation in the unsprayed areas was more than double that amount (38%). Both the sprayed and unsprayed areas in the Dryden project received the highest average defoliation of the three spray locations: 22% and 54%, respectively. The sprayed and unsprayed areas in the Kenora project received the lowest defoliation of the three spray locations: 10% and 32%, respectively.

In 2007, unusually high levels of precipitation were recorded for all three project areas during the time of the spray program (month of June). In June 2007, Dryden received a staggering 205.5 mm of rainfall; almost double the 30 year average for that month (Figure 2.12). Kenora received 66mm more rainfall and Atikokan received 18mm more rainfall than normal.

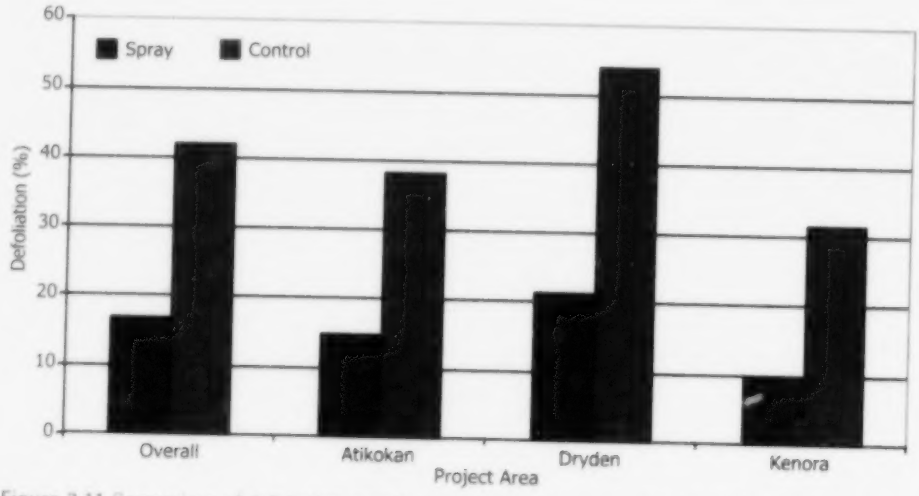


Figure 2.11 Comparison of defoliation severity in sprayed and unsprayed areas of the jack pine budworm infestation in northwestern Ontario, 2007.

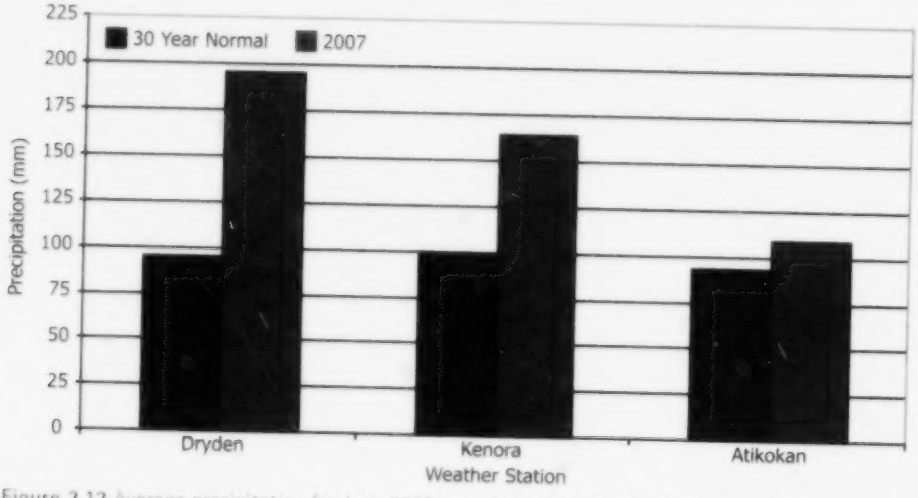


Figure 2.12 Average precipitation for June 2007 recorded at the Dryden, Kenora and Atikokan weather stations compared to the 30 year averages.

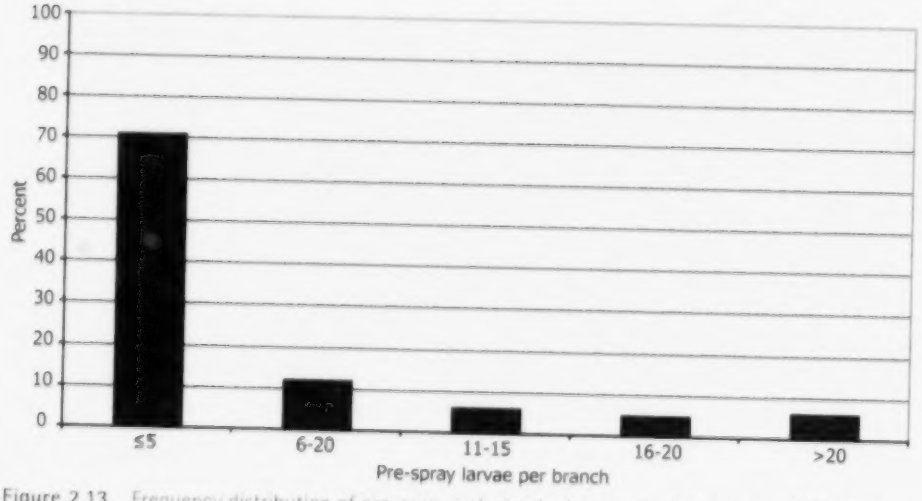


Figure 2.13 Frequency distribution of pre-spray jack pine budworm population in the 2007 spray program.

The heavy, prolonged rainfall made spray operations difficult, but may also have had an effect on budworm populations. In all three project areas, pre-spray jack pine budworm larval counts of fewer than five larvae per branch were recorded on more than 70% of the branches sampled (Figure 2.13). This was observed in both sprayed and unsprayed plots and may indicate a drop in jack pine budworm populations.

Jack pine budworm forecast for 2008

The majority of the life cycle of the jack pine budworm is spent as an overwintering second instar larva (L2) in silken shelters (hibernacula) under bark cracks and branch scales from August until the following spring. This stage of its life cycle provides the opportunity to sample branches, extract the larvae and count them to forecast the severity of defoliation for the following spring and summer. This L2 survey is used in decision-making for an insect pest management program.

To forecast jack pine budworm in 2008, L2 surveys were completed at 328 locations throughout the province in the fall of 2007. Locations were selected in or around the current infestation in the province as well as areas that historically have had jack pine budworm defoliation. Locations also included high value areas as identified by sustainable forest licensees. Ten jack pine trees were selected at each location and a one metre branch was sampled from the mid-to-upper crown of each tree. Each branch was rated for defoliation and sent back to a lab where the branches were processed in a sodium hydroxide washing procedure to force the second instar larvae from their hibernacula for counting. Larvae were then collected and counted under a microscope to determine the average number of jack pine budworm per branch for each location. This average was used to forecast the expected defoliation in 2008. An average of more than 54 larvae per branch forecasts severe defoliation for that location. Moderate defoliation is forecasted if there is 16 to 54 jack pine budworm per branch and light defoliation can be expected for 15 or fewer larvae per branch.

In Northwest Region, a total of 219 locations (2190 trees) were sampled in 2007 (Figure 2.14 and Table 2.5). There are no severe defoliation forecasts for the region for 2008 and only three moderate forecasts. The majority of the defoliation forecasts are light (147), while the remaining 69 locations have forecasts of no defoliation for 2008.

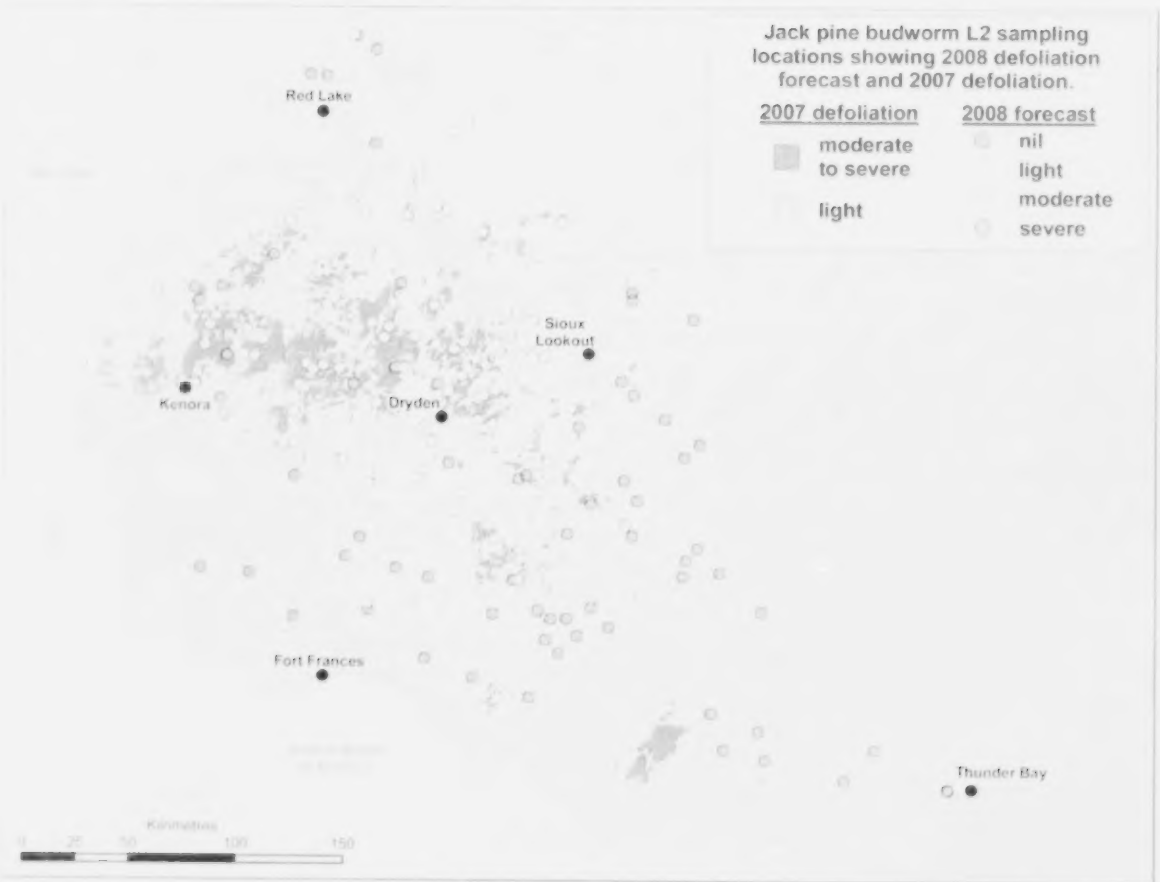
Dryden District had the greatest number of locations sampled. The majority (97%) of these sampled areas resulted in a light defoliation forecast or no defoliation forecast for 2008. Two sites have a moderate defoliation forecast: Gordon Lake Road, west of the Town of Vermillion Bay; and the junction of Hwy. 622 and Snake Bay Road.

Red Lake District had a total of 26 locations sampled in 2007. Light defoliation or no defoliation is forecasted for 25 of these locations. The only site that has a moderate defoliation forecast is located south of the Town of Ear Falls.

Fort Frances, Kenora, Sioux Lookout and Thunder Bay districts can expect light defoliation or no defoliation in 2008.

In Northeast Region, a total of 99 locations (990 trees) were sampled in 2007 (Figure 2.15 and Table 2.5). Defoliation forecasts for 2008 are relatively low, as 93% of the locations

Region District	Total locations sampled	Defoliation Forecast Nil	Light	Moderate	Severe
Northwest					
Dryden	71	17	52	2	0
Fort Frances	34	22	12	0	0
Kenora	58	10	48	0	0
Red Lake	26	5	20	1	0
Sioux Lookout	18	5	13	0	0
Thunder Bay	12	10	2	0	0
Subtotal	219	69	147	3	0
Northeast					
Chapleau	11	9	2	0	0
Sault Ste. Marie	20	12	7	1	0
Sudbury	52	26	23	2	1
Timmins	16	9	5	2	0
Subtotal	99	56	37	5	1
Southern					
Pembroke	10	1	8	1	0
Subtotal	10	1	8	1	0
TOTAL	328	126	192	9	1



either have a light forecast or no forecast. Five locations have a moderate defoliation forecast while only one have a severe forecast.

Moderate or severe defoliation is forecasted in parts of Sudbury District where a total of 52 locations were sampled in 2007. Severe defoliation was mapped in Scadding Township in 2007 and is forecasted to persist in 2008. Moderate defoliation can be expected in two locations in Sudbury District: the west side of Wanapitei Lake in Norman Township, and an area close to the Village of Nairn Centre where there has been severe defoliation for the last two years. Light or no defoliation is anticipated for the remainder of the locations.

A total of 20 locations were sampled in Sault Ste. Marie District in 2007. It is expected that the majority of these locations will not have jack pine budworm defoliation in 2008. An exception is Sagard Township, north of the Town of Elliott Lake, which has had moderate-to-severe jack pine budworm defoliation for the past three years and is expected to receive moderate defoliation in 2008. The 12 remaining locations have either a light or no defoliation forecast for 2008.

Sixteen locations in the southern portion of Timmins District were sampled to forecast jack pine budworm defoliation in 2008. Two locations, both in Westbrook Township south of the Town of Gogama, have a moderate defoliation forecast for 2008. Five locations have a light defoliation forecast. The nine remaining locations forecast no defoliation in 2008.

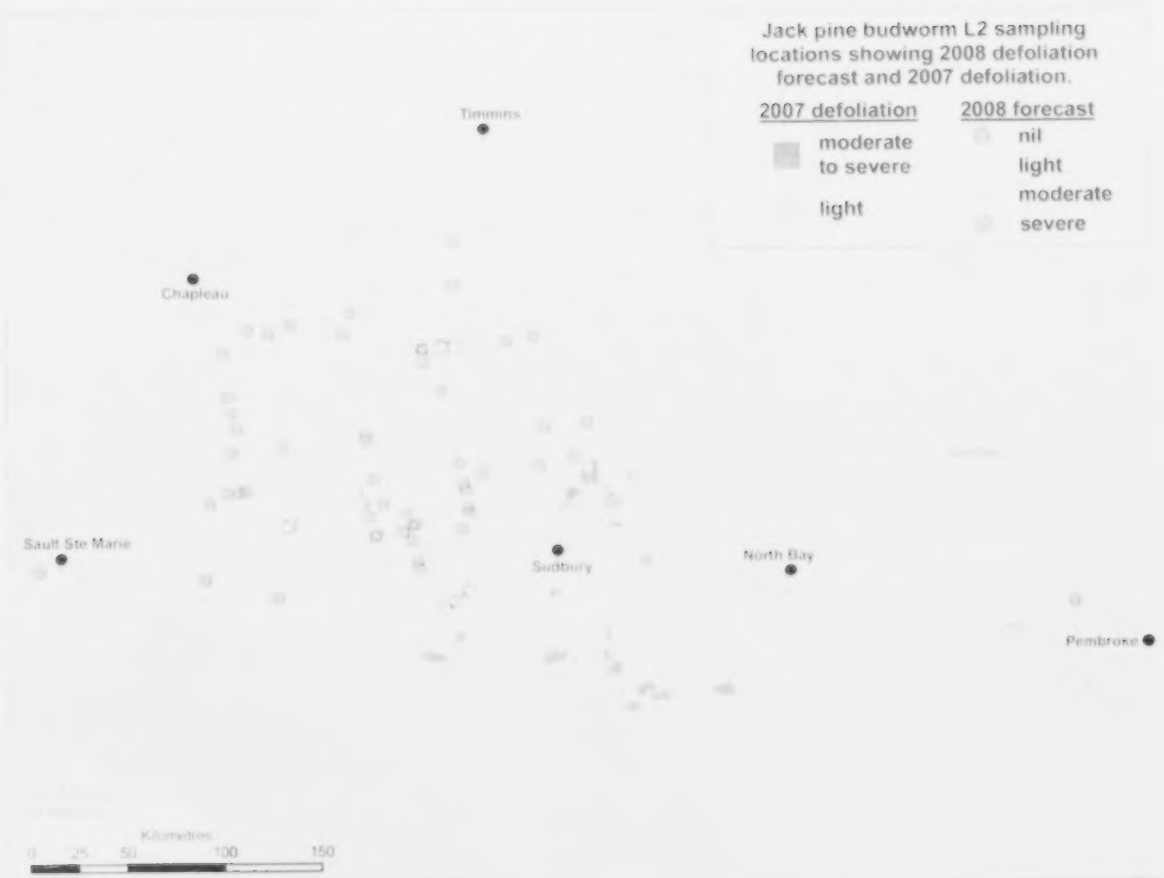


Figure 2.15 Jack pine budworm L2 sampling locations showing 2008 defoliation forecast and 2007 defoliation.

Table 2.5 Jack pine budworm defoliation forecasts in Ontario for 2008

Region District	Total locations sampled	Defoliation Forecast Nil	Light	Moderate	Severe
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Dryden	71	17	52	2	0
Fort Frances	34	22	12	0	0
Kenora	58	10	48	0	0
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Sioux Lookout	18	5	13	0	0
Thunder Bay	12	10	2	0	0
Subtotal	219	69	147	3	0
Northeast					
Chapleau	11	9	2	0	0
Sault Ste. Marie	20	12	7	1	0
Sudbury	52	26	23	2	1
Timmins	16	9	5	2	0
Subtotal	99	56	37	5	1
Southern					
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Subtotal	10	1	8	1	0
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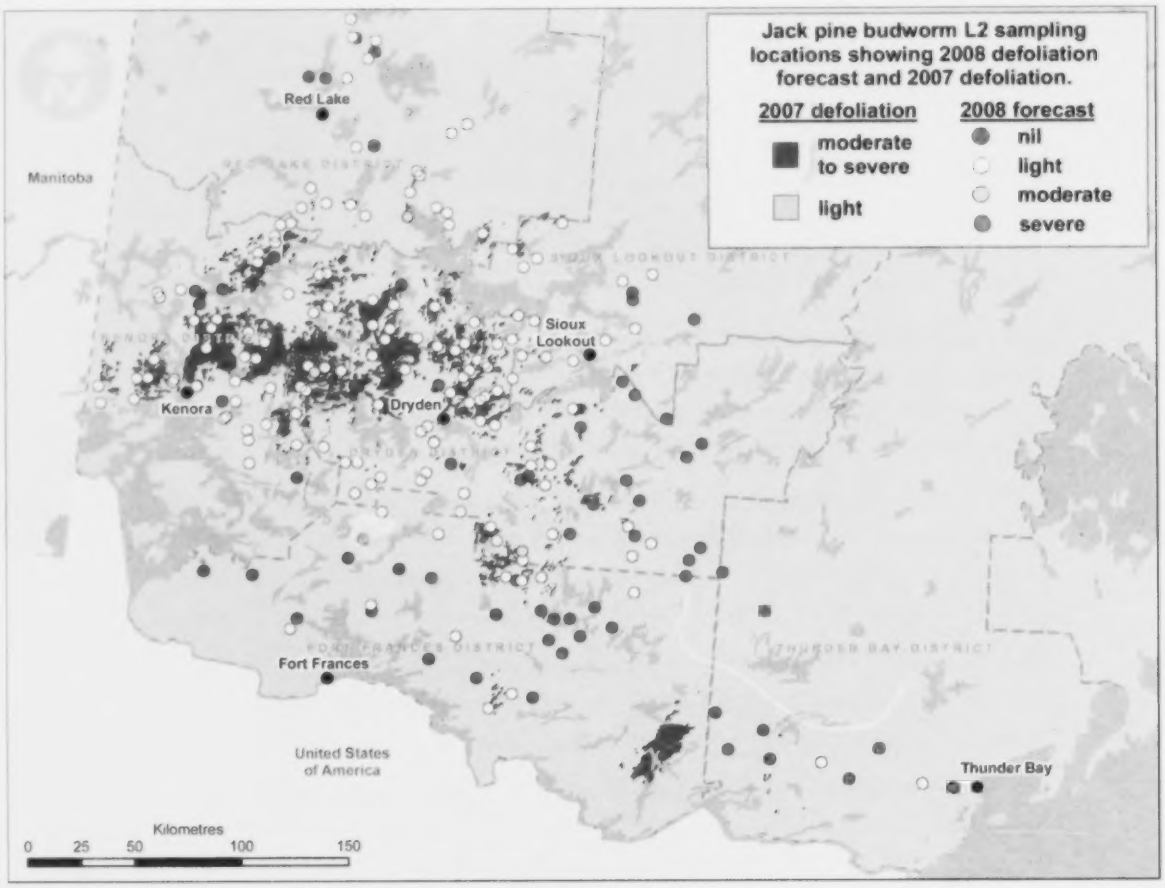

Figure 2.14 Jack pine budworm L2 sampling locations in Northwest Region; showing 2008 defoliation forecast and 2007 defoliation

either have a light forecast or no forecast. Five locations have a moderate defoliation forecast while only one have a severe forecast.

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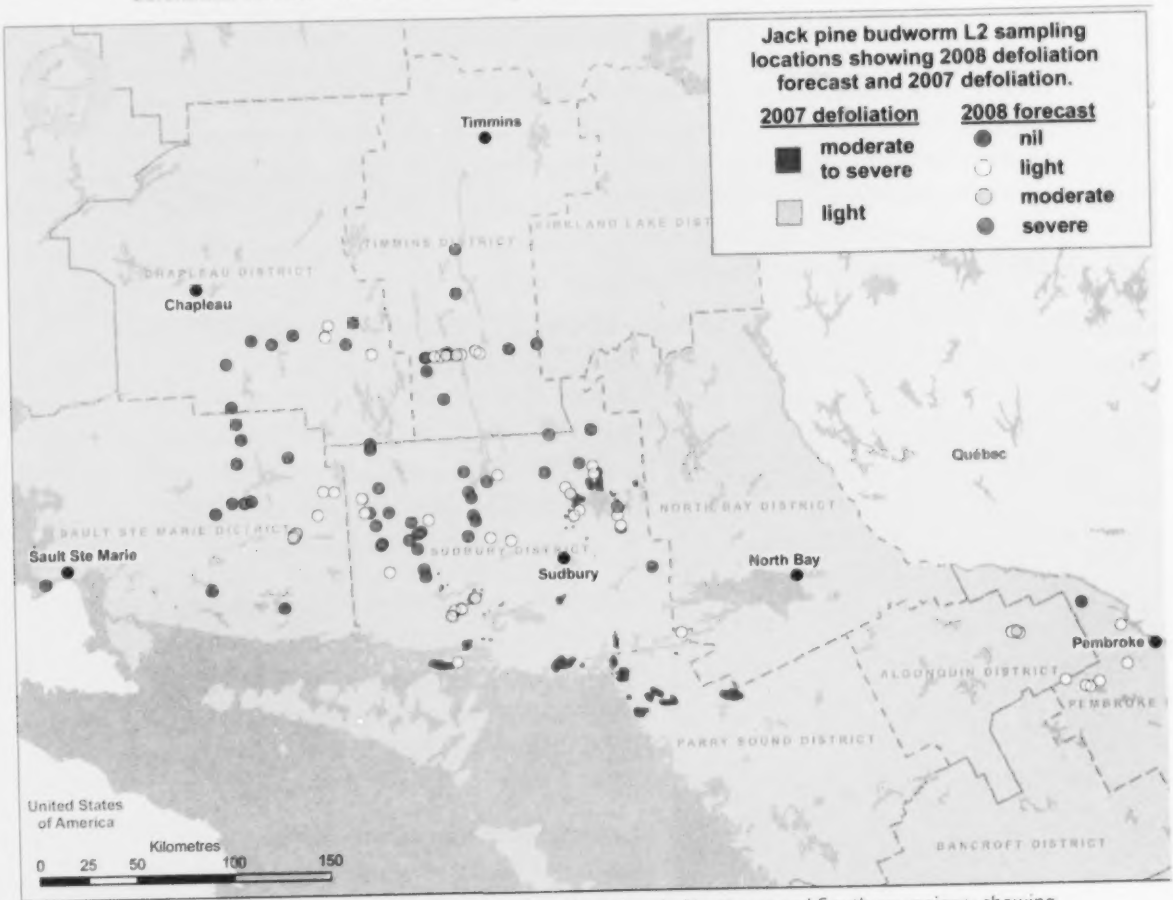


Figure 2.15 Jack pine budworm L2 sampling locations in Northeast and Southern regions; showing 2008 defoliation forecast and 2007 defoliation

Out of the 11 locations sampled in Chapleau District, nine areas can expect no defoliation in 2008 and two can expect light defoliation.

The only locations sampled in Southern Region were in Pembroke District (Figure 2.13). Out of the 10 locations sampled in Algonquin Park, one in the Lake Traverse area near the old observatory forecasts moderate defoliation. The infestation in Alice Township, southwest of Pembroke, along with seven other locations, has a light defoliation forecast for 2008. The only location that can expect no jack pine budworm defoliation in 2008 is located on Bronson Road southwest of the Town of Deep River.

Jack pine forest health assessments

In the mid 1990s, jack pine plots were established across northeastern and northwestern Ontario to monitor and study the impacts of jack pine budworm. In 2000, these plots were converted to 'jack pine forest health plots' to monitor the health of jack pine stands across northern Ontario (Figure 2.16). These permanent sample plots are monitored by forest health field staff, independent of any current jack pine budworm infestation. In Ontario in 2007, a total of 131 plots (6,550 trees) were rated for any pest, disease or abiotic factors affecting jack pine as well as the abundance of male flowers (Tables 2.6 and 2.7). There are 63 plots in northeastern Ontario and 68 in northwestern Ontario. Each plot is visited twice throughout the summer by forest health technicians.

In 2007, jack pine tree condition was similar in both northeastern and northwestern Ontario (Table 2.6). The majority of the trees had less than 25% defoliation of old and current foliage or between 25-50% total defoliation. Higher levels of defoliation were recorded in northwestern Ontario due to the large expanse of jack pine budworm infestation. New mortality was slightly higher in northwestern Ontario in 2007, but overall cumulative mortality is higher in the northeast.

Jack pine tree tops are relatively healthy in both regions of northern Ontario, however, surveys revealed a significant difference in male flower levels (Table 2.7). Male flowers are critical for survival of the young budworm larvae which emerge in the spring to feed on the pollen before moving to the current year's needles. Severely defoliated trees produce few male flowers the following year, resulting in poor larval survival and a reduction in budworm populations.

Figure 2.16 Jack pine forest health plot in Northwest Region (photo by M. Francis)

In Northwest Region 72% of the live trees in the jack pine forest health plots produced very few or no male flowers in 2007, while in northeast region male flowers were at moderate to high levels (79%). Defoliation in this area since 2005 is likely causing a reduction in flower production.

Jack pine budworm defoliation was found in 38 plots in Northwest Region and in 10 in Northeast Region (Table 2.8). More jack pine plots were defoliated by the jack pine budworm in the

Table 2.6 Condition of all trees rated in jack pine forest health plots

Region	Tree Condition (% of Trees)					
	Total Defoliation (%)				Mortality	
	<25	25-50	51-75	>75	New	Old
Northeast	52	14	3	1	1	28
Northwest	52	16	4	2	4	22

Table 2.7 Condition of tree tops and abundance of flowers of all trees rated in jack pine forest health plots

Region	Tree Condition (% of Trees)						
	Tree Top			Abundance of Flowers			
	Live	Bare	Dead	Nil	Light	Moderate	High
Northeast	98	1	1	2	18	24	55
Northwest	97	0	3	37	35	17	11

Table 2.8 Average current defoliation by jack pine budworm in jack pine forest health plots

Region	Jack Pine Budworm	
	Number of plots affected	Average current defoliation (%)
Northeast	10	23
Northwest	38	9

northwest but the average level of defoliation in the northwest (9%) was less than in the northeast (23%).

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The current outbreak of forest tent caterpillar peaked in 2001 when there were over 13 million ha infested with extensive areas of defoliation in all three regions (Figure 2.17). Since then, there has been a decline in the infested area. In 2007, the area of infestation primarily occurred in the Sudbury District of Northeast Region, where 351,003 ha of moderate-to-severe defoliation was mapped (Figure 2.18). This area of defoliation was very similar in size and shape to that of the previous year. There were also smaller areas of moderate-to-severe defoliation in Hearst and North Bay districts of Northeast Region and in Kemptville, Parry Sound and Peterborough districts of Southern Region. Defoliation from both regions totaled 371,494 ha (Table 2.9). Figure 2.19 illustrates the total area defoliated each year by the forest tent caterpillar from 1950.

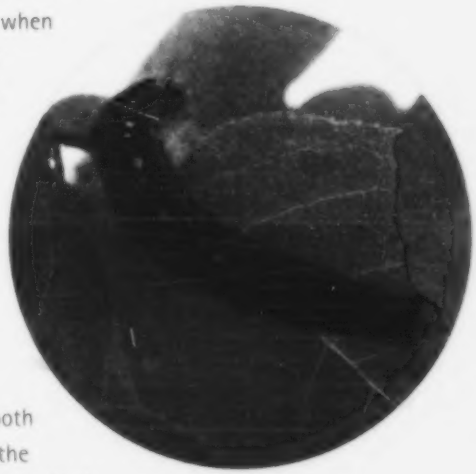


Figure 2.17 Mature forest tent caterpillar feeding on choke cherry in Hearst District (photo by L. Rowlinson)

Many hardwood species are subject to attack by the forest tent caterpillar. In the north, the preferred hosts are poplar and birch (*Betula* spp.), whereas in the south a wider variety of deciduous hosts are subject to attack. This year in the area infested in South Frontenac Township, Peterborough District, the hosts affected included red oak (*Quercus rubra* L.),

sugar maple (*Acer saccharum* Marsh.), basswood (*Tilia americana* L.), ironwood (*Ostrya virginiana* (Mill.) K. Koch) and ash (*Fraxinus* spp.).

Other insect defoliators are often found feeding in conjunction with the forest tent caterpillar. This year both gypsy moth (*Lymantria dispar* (L.)) and satin moth (*Leucoma salicis* (L.)) were also present in significant numbers at some of the infested sites in the Greater Sudbury area. The feeding from these two pests also contributed to the overall defoliation of host trees in the area.

Table 2.9 Gross area of moderate-to-severe defoliation caused by the forest tent caterpillar in Ontario, 2004 - 2007

Region District	Area of defoliation (ha) 2004	2005	2006	2007
Northwest				
Fort Frances	0	0	0	0
Nipigon	583 505	0	0	0
Thunder Bay	22 991	0	0	0
Subtotal	606 496	0	0	0
Northeast				
Hearst	29 223	0	0	3 740
Kirkland Lake	2 549	0	0	0
North Bay	143 239	28 501	4 946	13 615
Sault Ste. Marie	0	0	0	0
Sudbury	458 767	435 399	355 532	351 003
Timmins	3 459	0	0	0
Subtotal	637 237	463 900	360 478	368 358
Southern				
Kemptville	0	0	0	27
Midhurst	1 915	0	0	0
Parry Sound	31 886	5 932	10 281	2 135
Peterborough	0	0	0	974
Subtotal	33 801	5 932	10 281	3 136
TOTAL	1 277 534	469 832	370 759	371 494

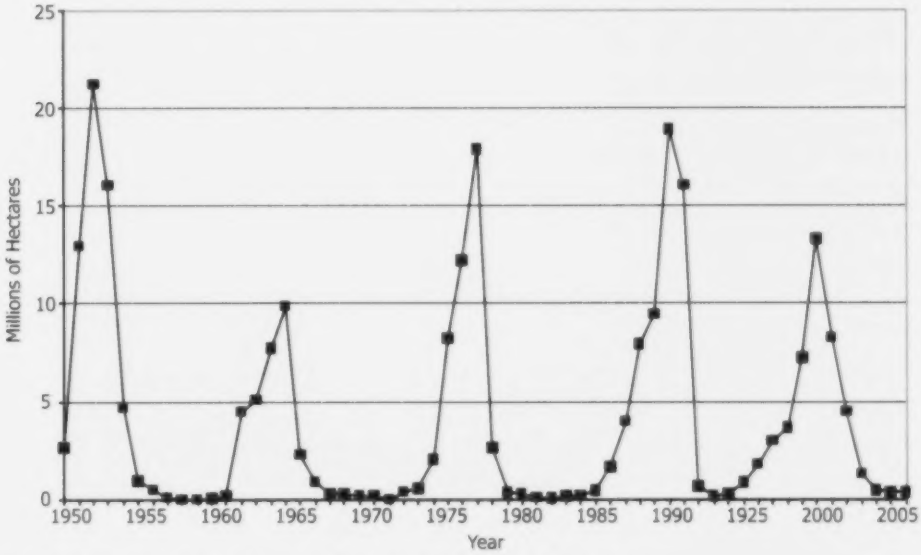


Figure 2.19 Forest tent caterpillar defoliation in Ontario 1950-2007.

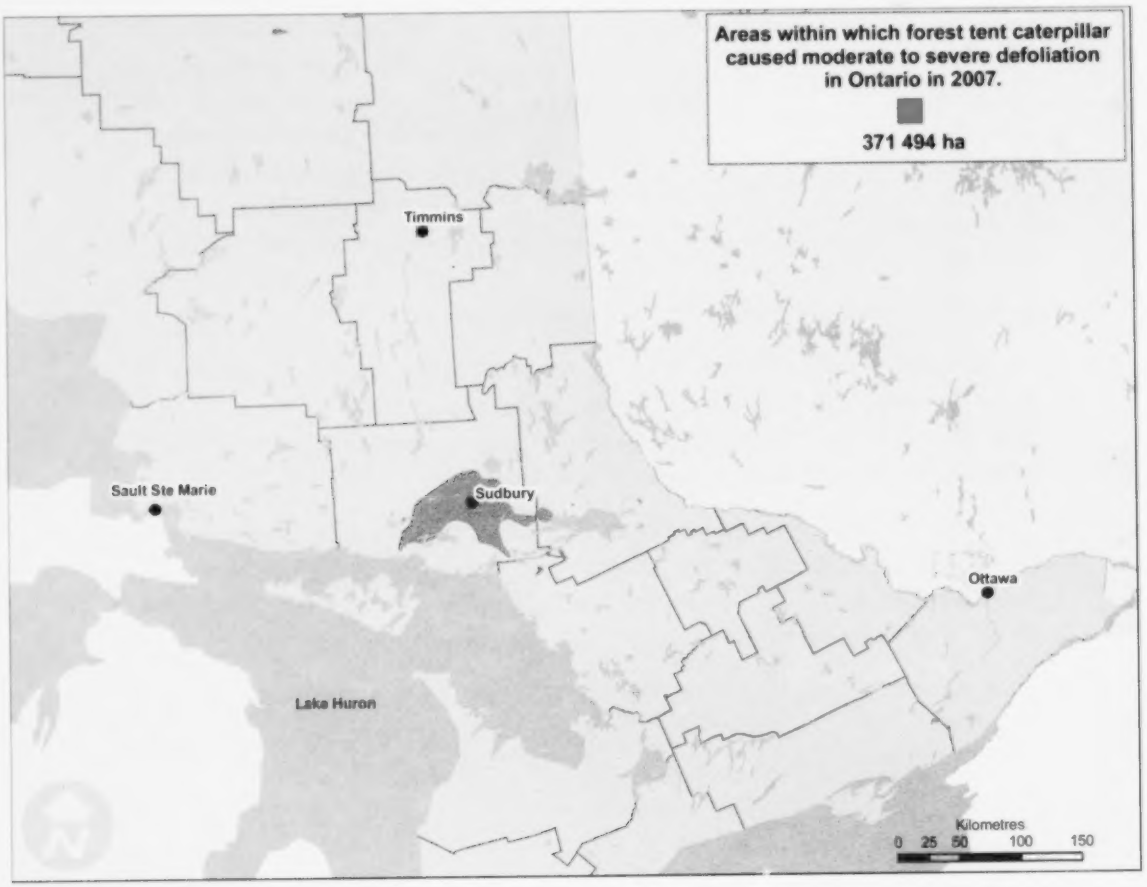


Figure 2.18 Areas-within-which forest tent caterpillar caused moderate-to-severe defoliation in Ontario, 2007

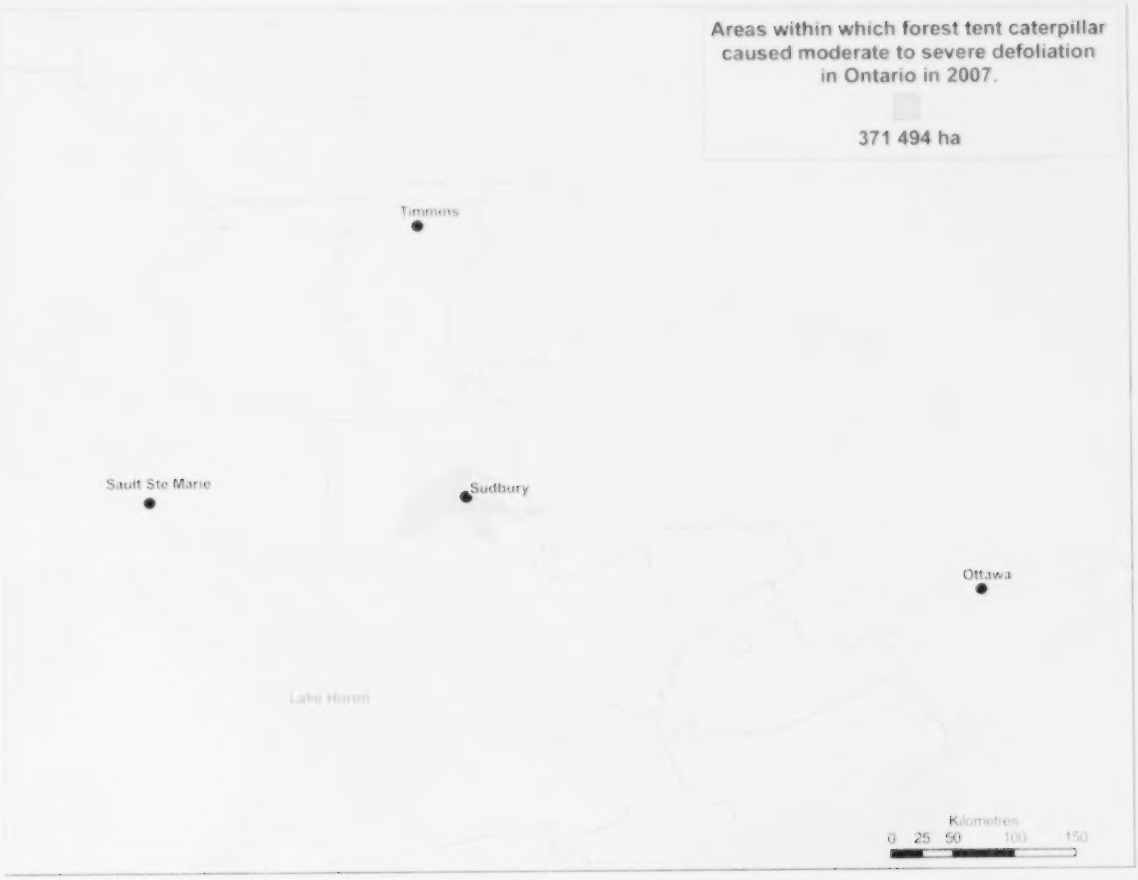
FOREST ABIOTIC EVENTS

Blowdown

During the week of June 25, 2007, a severe windstorm crossed a portion of northwestern Ontario snapping and uprooting trees over a 17,618 ha area in Fort Frances, Dryden, Kenora, and Thunder Bay districts (Table 2.10).

The largest area and initial starting point of the storm occurred north of Eagle Rock Lake, approximately 80 km south of Dryden in Fort Frances District. The storm (and its resulting damage) continued eastward along three distinct and parallel paths. One path passed through the Town of Ignace, Dryden District (Figure 2.20). Fort Frances District recorded 10,039 ha of damage which was oriented in an east/west direction. Dryden District recorded 7,166 ha of damage by this wind event.

Bent, twisted, snapped and uprooted trees of all species were left behind after the windstorm passed through. It continued in an easterly direction leaving three small pockets of blowdown totaling 400 ha in the McGrath Lake area, Thunder Bay District.



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Bent, twisted, snapped and uprooted trees of all species were left behind after the windstorm passed through. It continued in an easterly direction leaving three small pockets of blowdown totaling 400 ha in the McGrath Lake area, Thunder Bay District.

District	Area of damage (ha)
Dryden	7,166
Fort Frances	10,039
Kenora	13
Thunder Bay	400
TOTAL	17,618

High winds and tornado events are natural and often cause major forest disturbances. They result in gaps in forests that in turn create and destroy habitat for many wildlife species. A review of wind events from 1981-2007 revealed that in 22 of the last 27 years, wind damage has been recorded in Ontario.

The year in which the greatest area of damage was recorded was 2005 when 516,793 ha were documented throughout the province, surpassing the previous high of 258,455 ha in 1991 (Figure 2.21). When they occur in southern Ontario they garner much more attention because of the resulting power outages and road closures.

During the two years following a wind event, levels of activity and populations of insects such as bark beetles (*Ips* spp.) and woodborers (*Monochamus* spp.) usually increase and cause additional tree mortality to adjacent healthy trees. Fallen and downed trees may also become a significant fire hazard as they dry out in subsequent years.

Table 2.10 Districts in which blowdown occurred in northwestern Ontario, 2007

District	Area of damage (ha)
Dryden	7,166
Fort Frances	10,039
Kenora	13
Thunder Bay	400
TOTAL	17,618

High winds and tornado events are natural and often cause major forest disturbances. They result in gaps in forests that in turn create and destroy habitat for many wildlife species. A review of wind events from 1981-2007 revealed that in 22 of the last 27 years, wind damage has been recorded in Ontario.

The year in which the greatest area of damage was recorded was 2005 when 516,793 ha were documented throughout the province, surpassing the previous high of 258,455 ha in 1991 (Figure 2.21). When they occur in southern Ontario they garner much more attention because of the resulting power outages and road closures.

During the two years following a wind event, levels of activity and populations of insects such as bark beetles (*Ips* spp.) and woodborers (*Monochamus* spp.) usually increase and cause additional tree mortality to adjacent healthy trees. Fallen and downed trees may also become a significant fire hazard as they dry out in subsequent years.

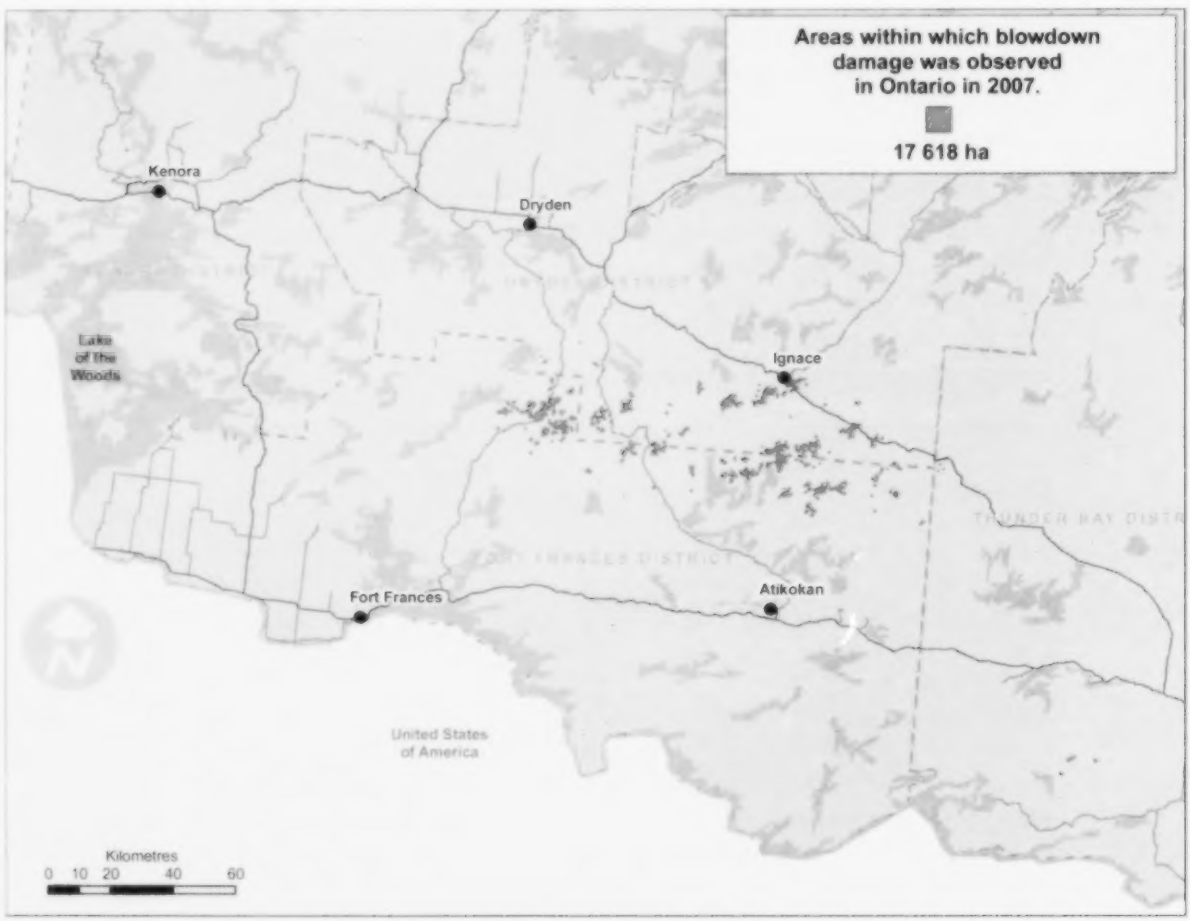

Figure 2.20 Area in which blowdown damage was recorded in Ontario, 2007

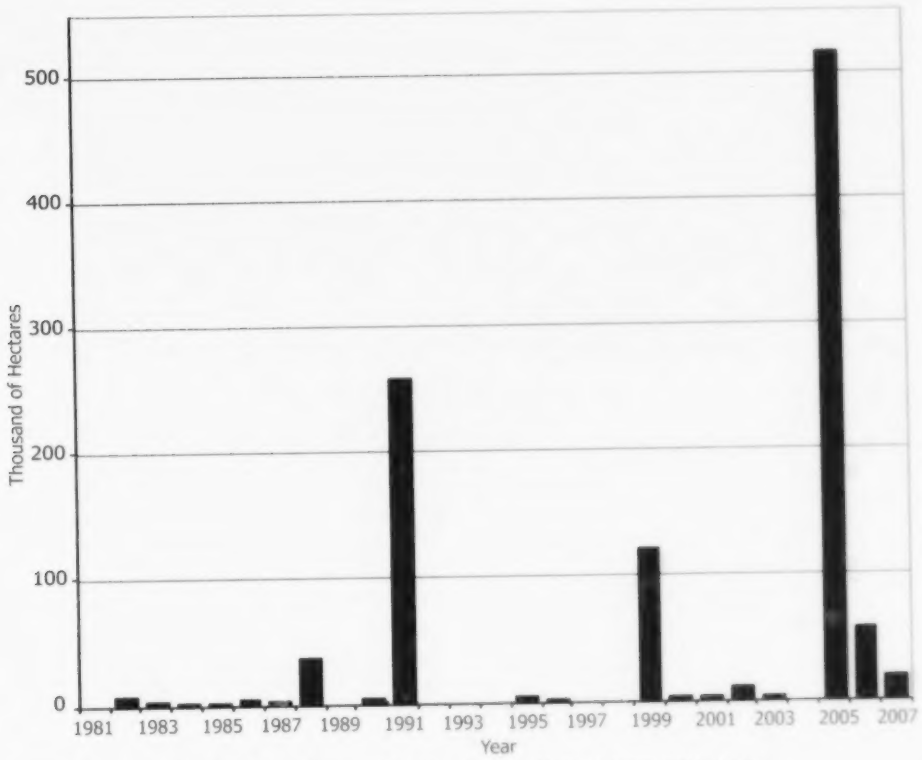

Figure 2.21 Summary of area damaged by blowdown in Ontario from 1981-2007

Drought Damage

Drought conditions had a continued presence across Ontario in 2007. Although drought damage was recorded in all three regions, the majority occurred in Southern Region where 30,562 ha of severe drought damage and 2,657 ha of light drought damage were mapped (Figure 2.22).

Overall the spring and summer brought below average precipitation to the Aylmer District, while most of the Guelph District fell far below normal with little rainfall for most of the summer. Signs of drought were quite evident along the Niagara Escarpment in the Guelph District as trees did not go through their transitional colour change to fall colours, but simply changed from green to brown.

Chlorotic foliage, leaf scorch, brown curled leaves, early fall coloration and premature leaf drop in early August recurred for the third consecutive year in the areas surrounding the Kawartha Lakes region of Peterborough and Bancroft Districts. Scorch is a common problem that is caused by high temperatures and drying winds, and results in the death and browning of leaf margins and tissue between the veins.

Hot, dry weather was also common for parts of the Parry Sound District in 2007. As summer progressed into August, the leaves of hardwoods growing on rocky outcrops started to fade. In addition, the foliage on many trees started to dry and turn brown along their leaf margins. A combination of scorch and drought symptoms resulted in browning of many hardwoods particularly in the western part of the district.

A severe shortage of rainfall during the summer of 2007 resulted in drought and scorch damage throughout the central portion of the province. Symptoms of drought included scorched leaves, early discoloration and premature defoliation. Sometimes only the stand edges were affected. Symptons were visible on hardwood species, including maples, beech, elm and basswood. In the Aurora District, the most significant area of damage was evident along the Niagara Escarpment in the Mount Nemo area (Burlington), and south and north of the town of Caledon in Peel Region. There were also areas of significant size affected throughout the Oak Ridges Moraine in the town of White Church-Stouffville, York Region and in the Uxbridge area, Durham Region. Numerous locations of smaller-sized areas of damage were also recorded as far east as the forested area north of Bowmanville.

In the non-forested area in the southern part of Aurora District, scorch was prevalent throughout the urban areas from Burlington east to Toronto. Less frequent damage occurred in Midhurst District. Ground surveys indicated that some drought related damage, especially scorch, occurred at locations in Simcoe, Dufferin and Grey counties at points along the Niagara Escarpment and at the north end of the Bruce Peninsula in Bruce County.

With below-normal precipitation in Thunder Bay District, drought-like symptoms were seen in late August in the southern part of the district. White birch and pin cherry trees on the more exposed drier sites experienced early leaf drop as well as symptomatic leaf scorch. Alder trees in traditionally wet areas along roadside ditches also experienced heavy scorch. The majority of the drought was observed along the Hwy. 61 corridor south of Thunder Bay to the Minnesota border. Severe drought totaling 2,353 ha was also mapped in scattered pockets of exposed sites with shallow soil across the Northwest districts of Fort Frances, Kenora, Dryden and Sioux Lookout.

Heavy flower and seed crop associated dieback

The heavy flower and seed crops produced in 2005 and 2006 were clearly evident during aerial mapping surveys of 2007. In Northeast and Northwest regions, heavy cone production on eastern white cedar (*Thuja occidentalis* L.) in 2006 caused trees to produce little or no new foliage in their upper crowns in 2007. Trees also appeared brown from the air because of their heavy seed crop.

While aerially mapping at 457 m (1500 feet) the heavy cone crops gave the mixed conifer stands a colour similar to that of defoliation by spruce budworm (*Choristoneura fumiferana* (Clem.)). Only after moving to a lower altitude was it clear that the cause of the discolouration was heavy seed crop on cedar. Often black and white spruce trees were mixed in with cedar trees that had heavy cone production in 2005 and 2006. This was particularly evident in Sault Ste. Marie District as large expanses of off-colour cedar stands appeared to be dying in an area from Wakomata Lake north to Aubrey Falls and west over to Ranger Lake, especially in Shingwaukonce and Villeneuve townships.

In Northeast Region, yellow birch (*Betula alleghaniensis* Britt.) trees also had heavy seed production in 2006 which resulted in very little or no crown foliage being produced in 2007. Many scattered yellow birch trees were observed with dead crowns through most of

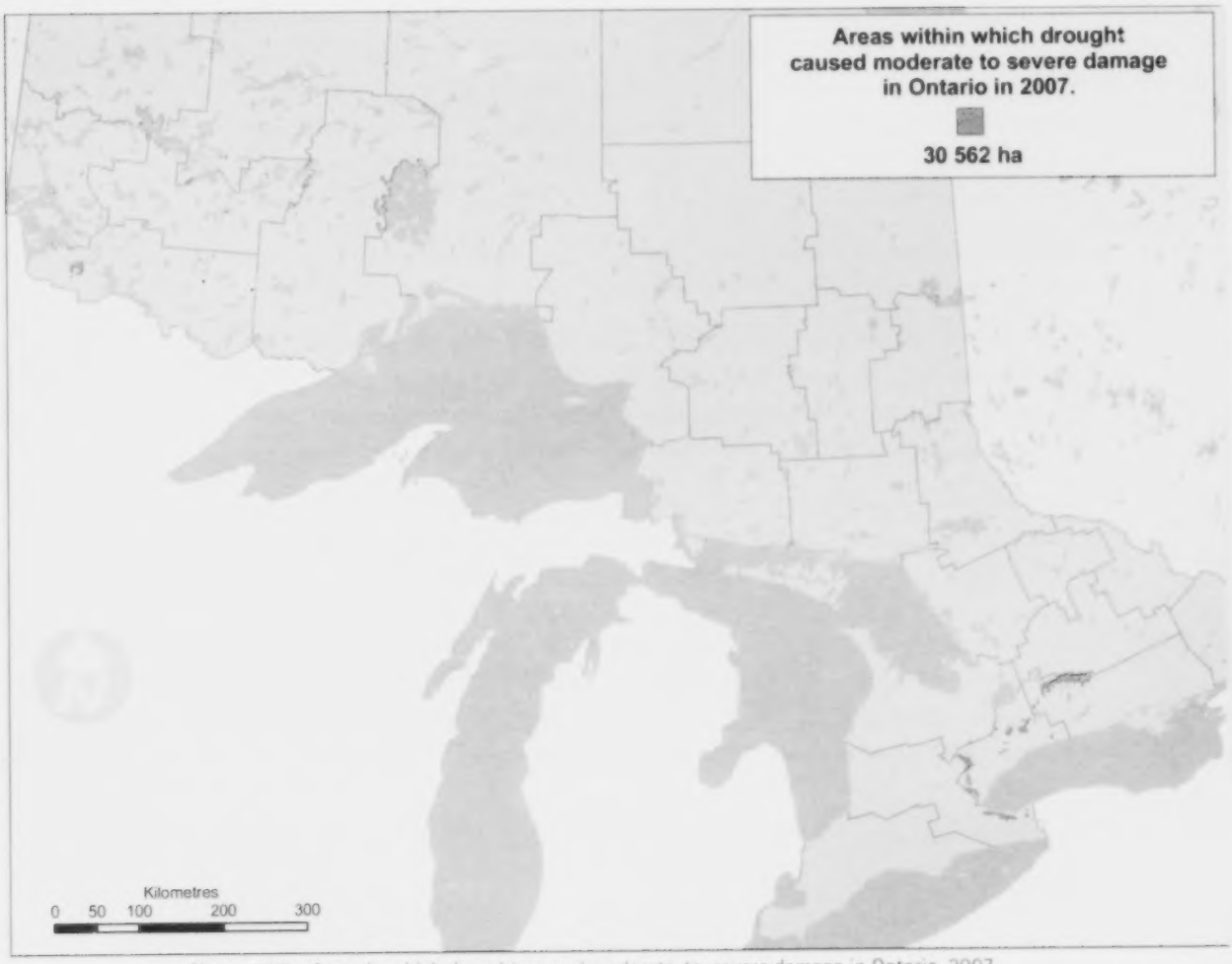

Figure 2.22 Areas in which drought caused moderate-to-severe damage in Ontario, 2007

the area north of Sault Ste. Marie east to Hwy. 129. The most notable areas observed were from Agawa to Rabbit Blanket Lake in Lake Superior Provincial Park and around Ranger Lake.

Freezing of Conifers

In 2007, a combination of weather anomalies caused browning of 1-year old and older conifer needles within a large area of the boreal forest in Northeast Region (Figure 2.23). A similar thaw/freeze event that primarily affected conifers, took place in Hearst and Cochrane districts. Winter snow accumulation was lower than usual in these areas during the winter of 2006/2007, and when combined with colder than average temperatures, a deeper ground frost resulted.

Temperature data from the Kapuskasing weather station showed that April 2007 was unusually warm (April 22nd+24.0°C) but quickly turned cold (April 23rd -0.5°C). The weather in May was equally as unpredictable; May 18th was a balmy +24.8°C, followed the next morning by snowfall and a drop in temperature to -6.1°C.

This spring thaw, followed by warmer than normal temperatures, which was then followed by rapid freezing to -6°C to -10°C, killed the older needles on the conifer trees. In most cases the current year growth had not yet flushed, and therefore did not suffer much damage. The existing needles on the trees, though, had become physiologically active and had lost some cold hardiness. They were then vulnerable to the rapid freezing at cold temperatures.

Mapping the damage was challenging in areas where not all the trees were affected, or where current year's flushing of both conifers and hardwoods obscured the brown needles.

These weather abnormalities contributed to severe levels of foliar browning over approximately 346,080 ha of conifer stands in Northeast Region (Figure 2.24). The majority of damage was observed on the lower crowns of primarily understory and plantation conifers including balsam fir, white and black spruce, larch (*Larix* spp.) and jack pine.

Many small areas were affected in the Hearst, Kapuskasing and Cochrane areas. However, two larger areas were aerially recorded in the Hearst, and Abitibi Canyon areas. The area near Hearst (151,670 ha) was north of Fushimi Provincial Park consisting of areas in Fushimi, Bannerman and Ritchie townships and unsurveyed land north to Limestone Lake. The largest area was recorded in Cochrane District (193,281 ha) beginning in Boyle Township extending north to the Missinaibi River and east to Ophir Township. This area stretched north along the Mattagami River and south to the Abitibi Canyon area. Another notable area (1,129 ha) was recorded south of Lake Abitibi near Garrison Township.

Figure 2.23 Freezing of spruce in Kapuskasing, northeastern Ontario (photo by Al Keizer)

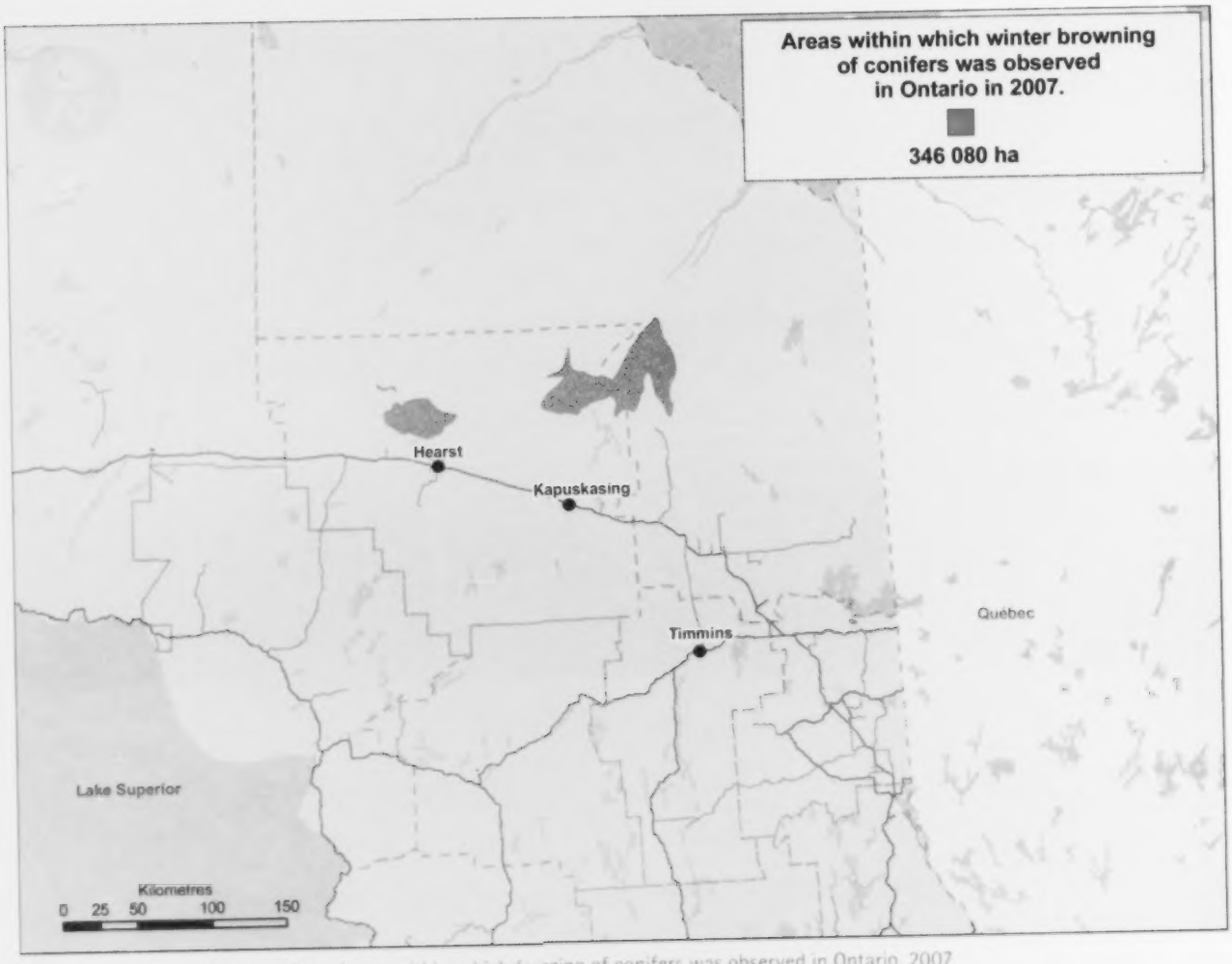

Figure 2.24 Areas-within-which freezing of conifers was observed in Ontario, 2007


Areas within which winter browning
of conifers was observed
in Ontario in 2007.
346 080 ha
Hearst
Kapuskasing
Timmins
Kilometres
0 25 50 100 150

Invasive Species in Ontario's Forests

P. Hodge[1], E.J. Czerwinski[1], H. Evans[2], M. Francis[1], A.J. Keizer[2] D. Rowlinson[1] and L. Rowlinson[1]

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SECTION 3

FOREST INSECTS

Pine false webworm, *Acantholyda erythrocephala (L.)*

Populations of this invasive defoliator were detected across Southern Region feeding on eastern white pine (*Pinus strobus* L.) and red pine (*P. resinosa* Ait.) in Pembroke, Midhurst, Aurora, Peterborough and Aylmer districts.

Numerous single tree infestations were recorded on semi-mature eastern white pine in Pembroke District with moderate defoliation occurring on eastern white pine near the Town of Douglas, Admaston Township and west into Algonquin Park District.

In Midhurst District, moderate-to-severe defoliation of eastern white pine occurred mainly in Grey County, however, defoliation was also detected in Bruce and Simcoe counties. An increase of roughly 30% in the area of defoliation occurred this year from 286 ha in 2006 to 377 ha in 2007 (Figure 3.1 and Table 3.1).

In Grey County, defoliation was recorded from approximately 20 different locations. Most of these occurred in the Township of Chatsworth and include an infestation at Lily Oak Tract in the Grey County Forest. Other infestations include areas northeast of Holland centre; east of Desboro; near McCullough Lake and in the Holford and Kinghurst areas. Infestations were also recorded in West Grey Township in six affected stands south of Kinghurst and east of Durham. In addition to those areas, an infestation north of Wilder Lake in Southgate Township was also recorded.

There were three areas of defoliation in the Municipality of Brockton, Bruce County and moderate defoliation recurred on the Drury Tract in the Simcoe County Forest, Oro-Medonte Township. At this location mature eastern white pine trees were moderately affected on approximately 10 ha of forested land.

In Aurora, Peterborough and Aylmer districts, low levels of pine false webworm were recorded. In Aurora District, defoliation occurred in the west section of the Ganaraska Forest, Municipality of Clarington, and Durham Region. Trace levels were detected on understory red and eastern white pine in a few scattered locations within Peterborough District. Aylmer District also showed trace levels on eastern white pine, just north of the St. Williams Conservation Reserve in an immature pine plantation. In addition to these locations heavy defoliation was recorded in the north end of the city of Sault Ste. Marie and in parts of Ojibway Park east of the city, in Sault Ste. Marie District.

Aerial reconnaissance did detect landscape level defoliation in Aylmer, Peterborough or Sault Ste. Marie districts and therefore are not included in the overall total of pine false webworm defoliation for 2007.

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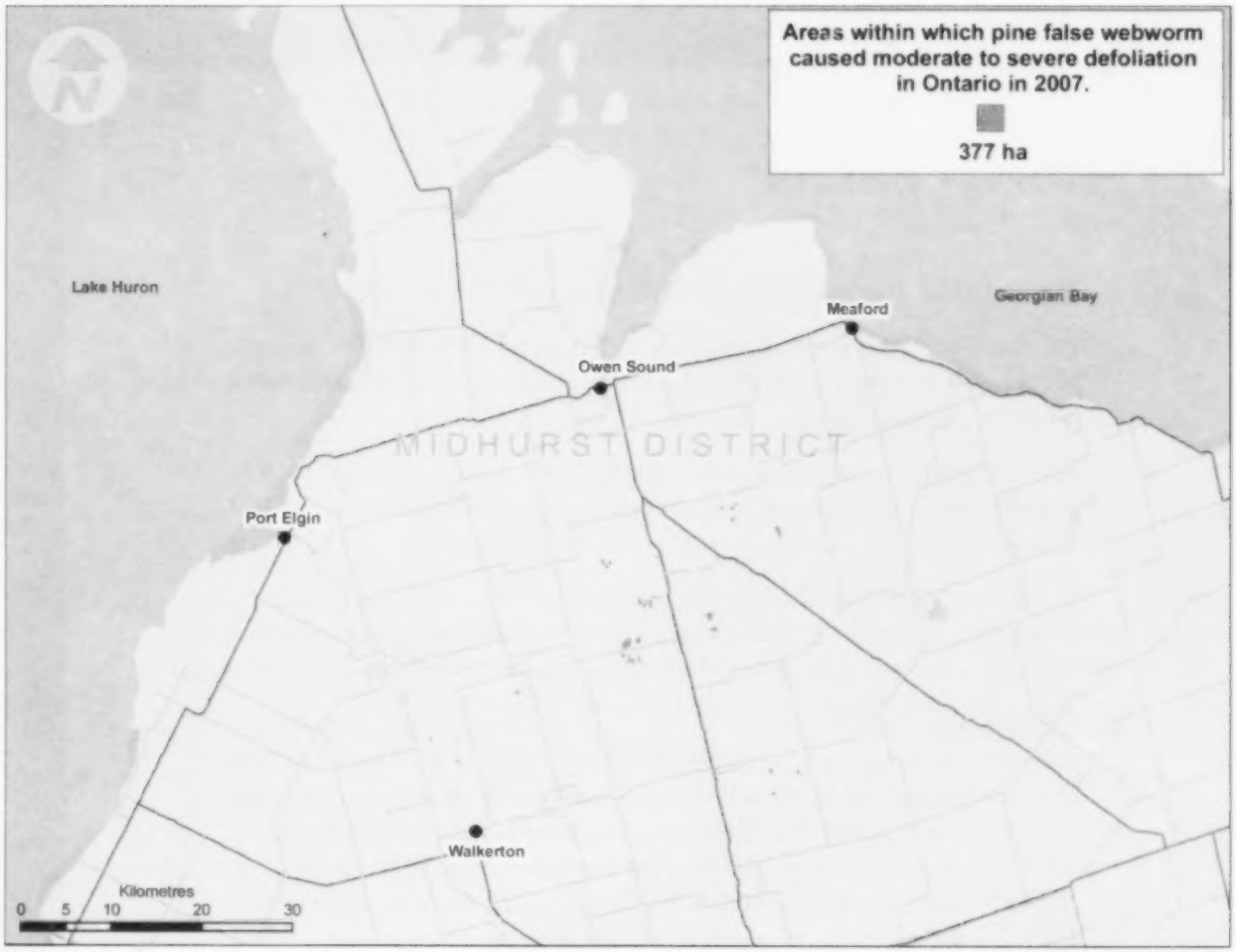

Figure 3.1 Areas-within-which pine false webworm caused moderate-to-severe defoliation in Ontario in 2007

Table 3.1 Area of moderate-to-severe defoliation caused by pine false webworm in Southern Region from 2003-2007

District	Area of decline (ha)				
	2003	2004	2005	2006	2007
Bancroft	16	0	0	0	0
Midhurst	737	1100	691	286	377
Peterborough	65	91	41	0	0
TOTAL	818	1191	732	286	377

Emerald ash borer, *Agrilus plannipennis* Fairmaire

Emerald ash borer (EAB) is an exotic buprestid beetle from Asia that likely migrated to Ontario after first establishing in the Detroit area of Michigan. While the adult beetle conducts maturation feeding on the foliage it is the larvae which girdle all species of ash (*Fraxinus* sp.) by feeding on the cambium underneath the bark, killing the tree (Figure 3.2).

Emerald ash borer was discovered in Ontario in the City of Windsor in 2002 by OMNR/CFS Forest Health staff. Since then, populations have established themselves throughout Essex County and the Municipality of Chatham-Kent; St. Clair Township, Lambton County; Municipality of Dutton-Dunwich, Elgin County; City of London, Middlesex County and most recently in wooded areas just north of Turkey Point Provincial Park, Norfolk County and in several city blocks in the vicinity of Sheppard Avenue East and Hwy. 404 in the City of Toronto (Figure 3.3).

In 2004 the CFIA created an Ash Free Zone (AFZ) which extended from Lake St. Clair to Lake Erie and covered an area of 10 km wide by 30 km long on the western edge of the Regional Municipality of Chatham-Kent. On June 13, 2007 the CFIA rescinded these regulations as widespread populations of emerald ash borer had established themselves north and east of the AFZ.

Figure 3.2 White ash with bark removed to expose emerald ash borer galleries (photo by L. Thompson)

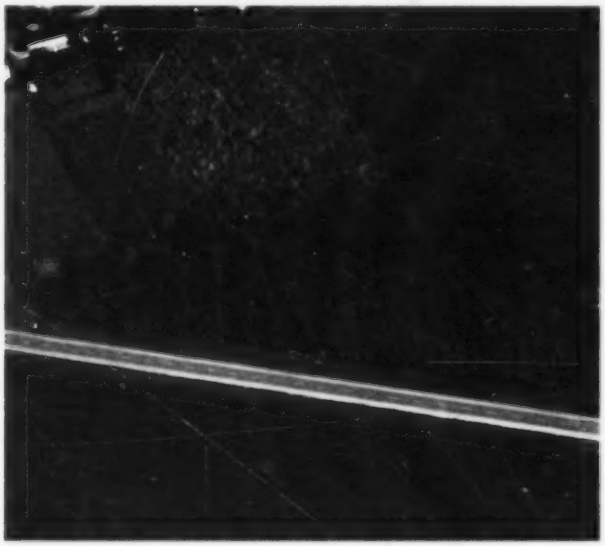

Figure 3.3 Woodlot in southern Ontario infested with emerald ash borer (photo by P. Hodge)

The emerald ash borer and ash material are regulated by the Canadian Food Inspection Agency (CFIA), Plant Quarantine Division. Areas regulated by the CFIA now include Essex County and the Municipality of Chatham-Kent, Lambton, Elgin, Middlesex and Norfolk Counties along with the Greater Toronto Area (Figure 3.4).

This insect is well established in several locations in southwestern Ontario as hundreds of thousands of ash trees are either dead or in decline from attack by this beetle (Figure 3.5). This tree mortality and decline (as evidenced by foliar chlorosis, twig and branch dieback, and branch mortality) has been aerially mapped annually since 2004 (Table 3.2). In 2004, the area of cumulative damage increased by nearly 70% from the previous year, reaching 7,361 ha. Most of this resulted from a major increase of tree mortality, mainly in Essex County.

Figure 3.5

Table 3.2

County / Municipality	Area of decline (ha)*			
	2004	2005	2006	2007
Chatham/Kent	0	0	173	863
Elgin	0	0	0	6
Essex	1 092	1 985	4 147	6 199
Lambton	0	0	69	287
Middlesex	0	0	0	6
Norfolk	0	0	0	0
Toronto	0	0	0	0
TOTAL	1 092	1 985	4 389	7 361

** Total area for Norfolk and Toronto area will be delineated in 2008*

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Figure 3.4 Areas regulated for the emerald ash borer by the Canadian Food Inspection Agency in 2007

This insect is well established in several locations in southwestern Ontario as hundreds of thousands of ash trees are either dead or in decline from attack by this beetle (Figure 3.5). This tree mortality and decline (as evidenced by foliar chlorosis, twig and branch dieback, and branch mortality) has been aerially mapped annually since 2004 (Table 3.2). In 2004, the area of cumulative damage increased by nearly 70% from the previous year, reaching 7,361 ha. Most of this resulted from a major increase of tree mortality, mainly in Essex County.

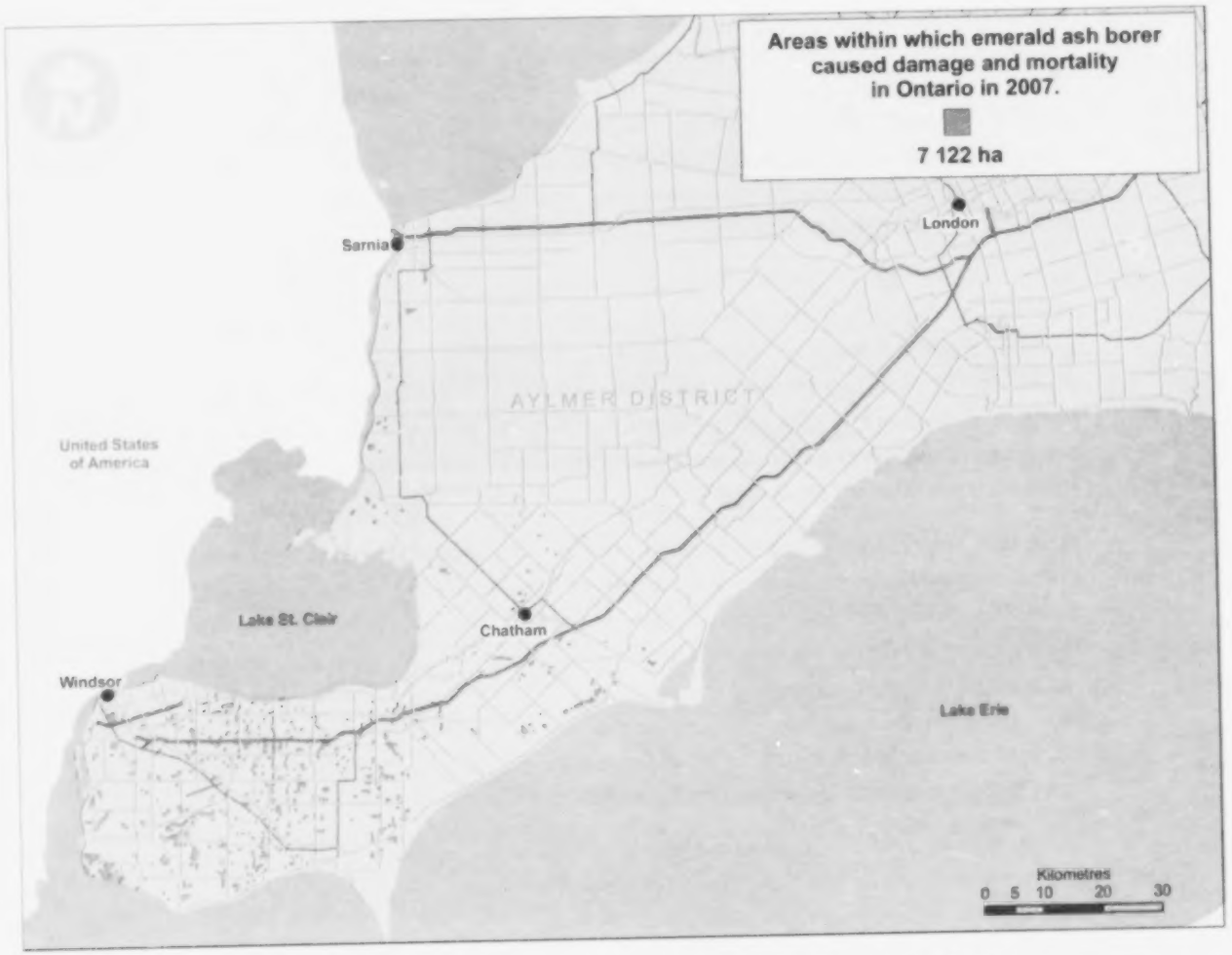


Figure 3.5 Areas-within-which emerald ash borer caused damage and mortality in Ontario

Table 3.2 Gross area of landscape level decline and mortality in Fraxinus spp. caused by emerald ash borer in Ontario 2004 – 2007

County / Municipality	Area of decline (ha)*			
	2004	2005	2006	2007
Chatham/Kent	0	0	173	863
Elgin	0	0	0	6
Essex	1 092	1 985	4 147	6 199
Lambton	0	0	69	287
Middlesex	0	0	0	6
Norfolk	0	0	0	0
Toronto	0	0	0	0
TOTAL	1 092	1 985	4 389	7 361

* *Total area for Norfolk and Toronto area will be delineated in 2008*

Asian long horned beetle, *Anoplophora glabripennis* (Mots.)

The Asian long-horned beetle is a destructive wood boring insect from Asia found in a border area of Toronto and the City of Vaughan in 2003. This was the first confirmed infestation in Canada and was likely introduced into North America by way of wooden pallets, crates, or packaging materials used in shipping. The Canadian Food Inspection Agency (CFIA) is leading the multi-agency eradication program for this insect. Other participating partners are the cities of Toronto and Vaughan, York Region, Toronto Region Conservation Authority, Canadian Forest Service, Ontario Ministry of Natural Resources, and the U.S. Department of Agriculture, Agriculture Research Service. To limit artificial spread of the insect, the CFIA has implemented a regulated containment zone in the border area between Toronto and Vaughan, restricting the movement of material from host tree species.

The eradication program consists of surveys to find infested trees by visually inspecting trees from the ground by climbing the trees, or using bucket trucks. From 2003 until 2006, once an infested tree was identified that tree and any host tree species within 400 m was cut down. Each entire tree was inspected for signs of Asian long-horned beetle infestation, including exit holes and oviposition pits. The infested trees were cut into sections and dissected to determine year of attack, number of attacks, proportion of successful emergence, and other biological data.

In the early stages of this program, starting in 2003, the date of infestation was often several years previously, dating back in some cases to 1998. As the program has progressed, the recently discovered infested trees were attacked within the last two years. Based on this and the propensity for the beetle to not disperse very far on its own, the eradication program was adjusted in 2007 to cutting host trees within 200 m of a known infested tree. Should any of these trees be found infested, then a second cutting is done of all host trees within 200 m of the infested tree. Figure 3.6 shows the number of trees from 2003-2007 that were found with signs of Asian long horned beetle attack.

To date, approximately 27,400 trees have been removed from the regulated area by the CFIA. For more information on Asian long-horned beetle visit the Canadian Food Inspection Agency website: www.inspection.gc.ca or contact the CFIA at 1-800-442-2342

Larch casebearer, *Coleophora laricella* (Hbn.)

In 2007, populations of larch casebearer caused moderate-to-severe defoliation (Figure 3.7) as well as a significant amount of mortality (Figure 3.8) to tamarack (*Larix laricina* (Du Roi) K. Koch), in the Pembroke and Kemptville districts, Southern Region. Other infestations causing moderate-to-severe defoliation occurred in the Aurora and Midhurst districts (Figure 3.8).

In Pembroke District, a total of 1,661 ha of moderate-to-severe defoliation and 1,328 ha of mortality were recorded for tamarack throughout several townships.

Kemptville District experienced a heavy spring defoliation of tamarack by larch casebearer, which resulted in approximately 5,102 ha of widespread mortality in many low lying areas.

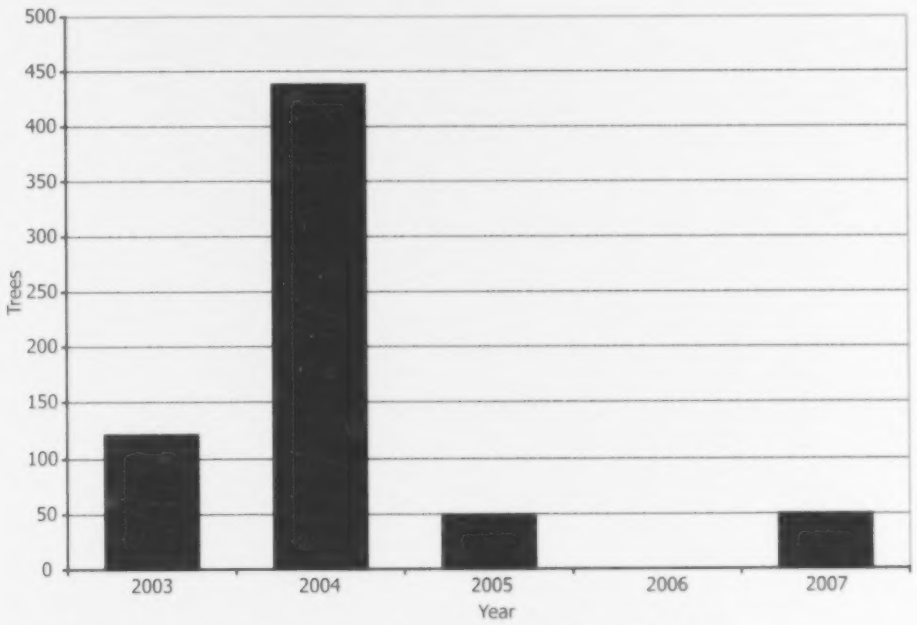


Figure 3.6 Trees with signs of Asian long horned beetle attack, 2003-2007

A total of 8,407 ha of moderate-to-severe defoliation were recorded throughout the remaining infested areas.

In Midhurst District, larch casebearer has been a perennial problem for tamarack. This year the insect was responsible for defoliating 277 ha of the host species in the Minising Swamp area. Small pockets of tamarack defoliation were also recorded in the Town of East Gwillimbury and on European larch (*Larix decidua* Mill.) in the North Tract of the York Regional Forest, Aurora District.

Defoliation and subsequent tree mortality by this introduced insect has been on-going at various levels in Ontario since 1998. Moderate-to-severe defoliation has been occurring to tamarack in several locations, often in scattered pockets, approximately south of a line from Sault Ste. Marie to Mattawa. Tree mortality in these areas of attack is often in association with colonization by the larch beetle (*Dendroctonus simplex* LeConte). Maps from aerial surveys underestimate the area affected because of the scattered distribution of tamarack over the landscape.

Birch casebearer, *Coleophora serratella* (L.) & **lesser birch casebearer**, *C. comptoniella* (McD.)

The birch casebearer and lesser birch casebearer have been recorded in the Kemptville and Pembroke Districts in 2007. In the Kemptville District, birch casebearer damage was recorded at light levels in two locations. One site was located at an immature grey birch (*Betula populifolia* Marsh.) stand in Gloucester Township; the other was detected at the Agroforestry Centre in Oxford Township in a semi-mature white birch (*B. papyrifera* Marsh.) stand. The lesser birch casebearer was also recorded at light levels on small pockets of birch in Cambridge and Gloucester townships, Kemptville District and commonly along Bronson Road in Ralph Township, Pembroke District.

Figure 3.7 Areas-within-which larch casebearer caused moderate-to-severe defoliation in Ontario in 2007

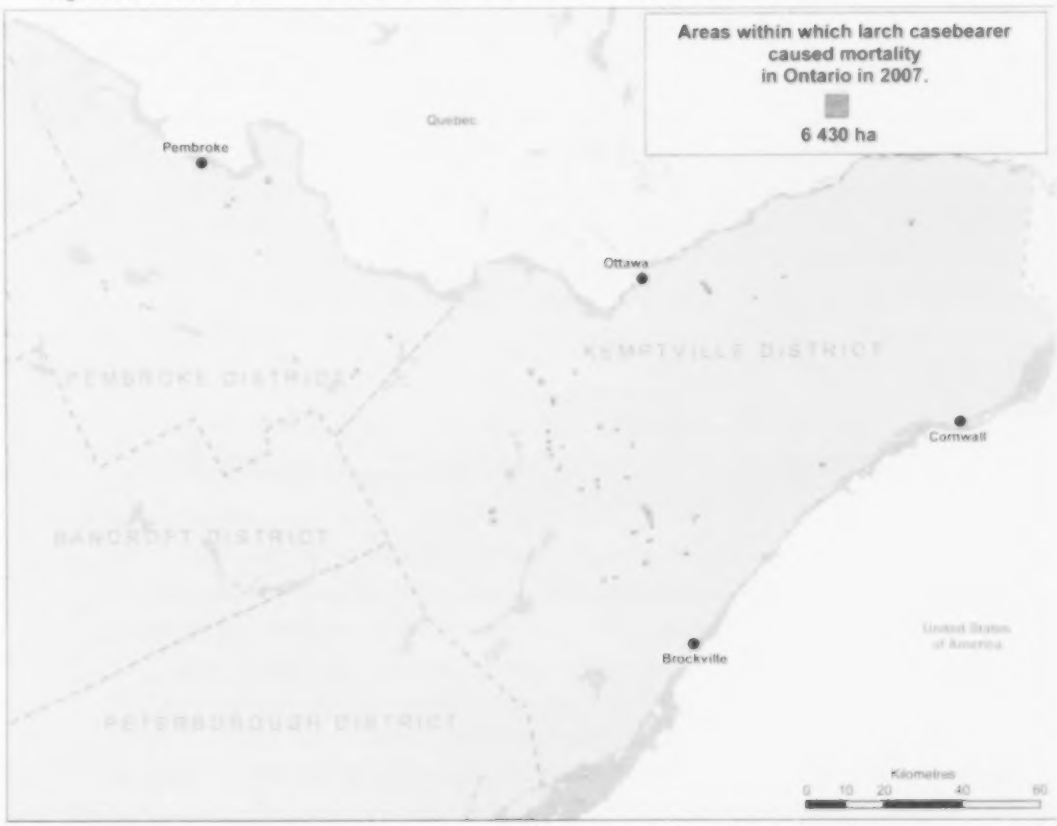


Figure 3.8 Areas-within-which the larch casebearer caused mortality in Ontario in 2007

Beech scale, *Cryptococuss fagisuga* Linding.

This exotic pest is commonly associated with beech bark disease (*Nectria coccinea* (Pres.: Fr.) Fr. *var. faginata* Lohman, Watson and Ayers, or *N. galligena* Bres.) (Figure 3.9) and is thought to have been introduced to North America through Halifax, Nova Scotia in the late 1920s. Today, beech scale is found in many woodlots throughout Southern Region (Figure 3.10). In 2007, a range extension for this insect was recorded northwest of previous known distribution, near the community of Atwood, Guelph District. In this area, high populations of scale were detected while there were no signs of the fungal causal agent which causes beech bark disease.

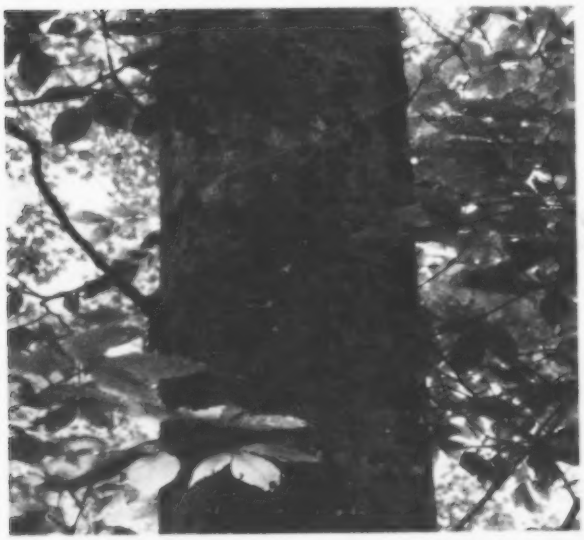


Figure 3.9 Beech bark disease in southern Ontario (photo by E. Czerwinski)

Figure 3.10 Beech scale on American beech in southern Ontario (photo by L. Tucker)

Satin moth, *Leucoma salicis* (L.)

The satin moth is an exotic defoliator introduced to North America from Europe in the early 1920s (Figure 3.11). Presently, this insect is found in the Greater Sudbury Northeast Region area and in many areas of Southern Region of Ontario. Defoliation was observed on various species of poplar including: Carolina poplar (*Populus Xcanadensis* Moench); trembling aspen (*Populus tremuloides* Michx.) and European white poplar (*P. alba* L.).

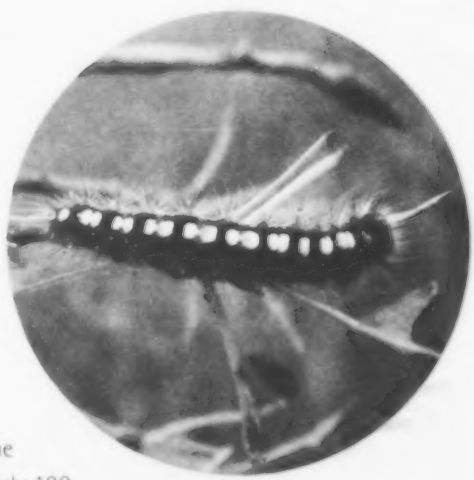


Figure 3.11 Mature satin moth caterpillar in southern Ontario (photo by H. Evans)

The 2007 discovery of the satin moth in Aylmer District is the first record of this insect in this part of Ontario. Approximately 100 European white poplar trees along the south side of the Talbot Trail Hwy., 2 km. east from the Town of Jarvis, were completely defoliated.

In Midhurst District, satin moth infestations were recorded in Simcoe County along Hwy. 11 and Hwy. 400, and in Grey County along Hwy. 4 west of Durham. In the majority of these cases affected trees were completely defoliated.

Satin moth was noted to have caused severe defoliation on Carolina poplar in Bancroft District north of Kaladar signifying a slight range extension. It was also found on European white poplar in the Tyendinega Indian Reserve outside of Marysville, Peterborough District. Only a few trees were defoliated at each site.

Gypsy moth, *Lymantria dispar* (L.)

In 2007, moderate-to-severe gypsy moth defoliation (Figure 3.12) reached a total of 31,094 ha; all of which occurred in Southern Region of Ontario (Table 3.3 and Figure 3.13). In the Northeast Region, low populations were detected from the ground in the Sudbury area, Sudbury District and on Manitou Island in Lake Nipissing, North Bay District. These populations did not cause landscape level defoliation that could be mapped from the air and therefore were not included in the total area infested.

Figure 3.12 A red oak defoliated by gypsy moth in mid-June (photo by P. Hodge)

Moderate-to-severe defoliation occurred within wooded areas of Guelph, Aylmer and Aurora Districts. A total of 25,556 ha of moderate-to-severe defoliation were recorded in Guelph District in 2007. The majority of that defoliation occurred in the southern portion of the Six Nations Indian Reserve as well as the Mississaugas of the New Credit, both of which are located in Brant County. Several woodlots throughout Haldimand County east of Hagersville were also defoliated at moderate-to-severe levels and in wooded areas surrounding the towns of Cayuga and Dunnville. Moderate-to-severe defoliation was also observed south of Stoney Creek in the Regional Municipality of Hamilton-Wentworth; in the surrounding area of Smithville, West Lincoln County; and throughout the County of Wainfleet. Defoliation was primarily recorded on white oak (*Quercus alba* L.), red oak (*Q. rubra* L.), trembling aspen, black cherry (*Prunus serotina* Ehrh.), willow (*Salix* spp.), sugar maple (*Acer saccharam* Marsh.), eastern white pine and white birch.

This is the third consecutive year that the Six Nations Indian Reserve and the surrounding area of Cayuga have been infested. This defoliation, combined with recent drought-like conditions has elevated the level of stress on these specific wooded areas. Visual inspections of infested areas revealed low levels of the larval fungus, *Entomophaga maimaiga* and the nucleopolyhedrosis virus which appears to have had little influence on established populations of gypsy moth this year.

The area of moderate-to-severe defoliation for Aylmer District in 2007 increased five fold to 4,064 ha from the previous year's infestation. This occurred in several woodlots throughout Norfolk County with small pockets north of Simcoe to Teeterville and east to the Norfolk/Haldimand county line, with larger pockets south of Delhi and west of Simcoe to the St. Williams Crown Forest Reserve area. Other infestations causing moderate-to-

severe defoliation occurred further west in the township of Delaware, southwest of London along Hwy. 401, Middlesex County, along with defoliation in small wooded areas east of Woodstock, Oxford County and south of the City of London in Middlesex County. Host trees affected by gypsy moth in Norfolk County are the same as those recorded in Guelph District.

The total amount of moderate-to-severe defoliation that occurred in the Aurora District increased from 445 ha in 2006 to 1,474 ha in 2007. The largest areas of defoliation occurred in the City of Burlington and the Town of Oakville, where large areas of damage were noted along the Hwy. 407 corridor, along Bronte and Sixteen Mile creeks and in wooded areas in the far southwest corner of Burlington. There were also several areas of defoliation recorded in woodlots in the Town of Milton as far north as the Hilton Falls Conservation Area. Low levels of defoliation were found in the City of Toronto, particularly in the Moore Park area. Small populations were also recorded causing moderate-to-severe defoliation in wooded areas on Bathurst Street in the City of Vaughan.

Table 3.3 Area of moderate-to-severe defoliation caused by the gypsy moth in Ontario from 2003-2007

Region District	Area of defoliation (ha) 2003	2004	2005	2006	2007
Southern Region					
Aurora	0	0	69	445	1 474
Aylmer	0	16	32	776	4 064
Bancroft	5 216	248	0	0	0
Guelph	0	0	1 141	8 956	25 556
Kemptville	938	0	0	0	0
Midhurst	11 728	0	0	0	0
Parry Sound	25 732	0	0	0	0
Pembroke	0	0	0	0	0
Peterborough	14 690	0	0	0	0
Subtotal	58 304	264	1 242	10 177	31 094
Northeast Region					
North Bay	0	177	0	132	0
Sault St. Marie	130	0	0	0	0
Sudbury	979	0	0	0	0
Subtotal	1 109	177	0	132	0
TOTAL	59 413	441	1 242	10 309	31 094

In mid-July and into August the female gypsy moth will lay all of her eggs in a single, buff-coloured egg mass. The number of eggs in this mass can vary from as low as 100 to more than 1,000 eggs. These egg masses are laid in sheltered areas on trees, or on rocks or fallen logs or branches on the ground. A small caterpillar develops in the egg and will remain in this state over the winter. Field counts of the number of egg masses in a woodlot can be used to forecast gypsy moth defoliation for the succeeding year.

In the fall of 2007 a gypsy moth egg mass survey was done at St. Williams Crown Forest Reserve and Turkey Point Provincial Park in Norfolk County to forecast gypsy moth defoliation for 2008. Fixed area plots (10m x 10m), known as a Modified Kaladar Plots (MKPs), were established and the number of new gypsy moth egg masses per hectare was recorded. When forecasting defoliation, 1-1235 egg masses/ha results in light defoliation, 1236-6175 egg masses/ha results in moderate defoliation and more than 6175 egg masses/ha results in severe defoliation.

Data from the St. Williams Crown Forest Reserve forecasts severe defoliation for 2008 in 78% of the plots and half of the plots in Turkey Point Provincial Park also had a severe forecast (Table 3.4)

Table 3.4 Gypsy Moth Defoliation Forecast for 2008 using Modified Kaladar Plot system

Location	UTM Coordinates	Total no. eggmasses per Ha	Defoliation forecast for 2008
St. Williams Plot # 1 A	17 544682 4728194	75,200	Severe
St. Williams Plot # 1 B	17 544470 4728495	21,200	Severe
St. Williams Plot # 1 C	17 544630 4728165	78,500	Severe
St. Williams Plot # 2 A	17 544515 4728504	1,200	Light
St. Williams Plot # 2 B	17 544628 4728199	50,900	Severe
St. Williams Plot # 2 C	17 544710 4728531	21,000	Severe
St. Williams Plot # 3 A	17 542989 4727711	39,000	Severe
St. Williams Plot # 3 B	17 543027 4727654	58,000	Severe
St. Williams Plot # 3 C	17 543068 4727684	26,000	Severe
St. Williams Plot # 4 A	17 543084 4727287	1,700	Moderate
St. Williams Plot # 4 B	17 543079 4727390	1,300	Moderate
St. Williams Plot # 4 C	17 543070 4727385	5,600	Moderate
St. Williams Plot # 5 A	17 543375 4728260	35,100	Severe
St. Williams Plot # 5 B	17 543375 4728260	117,700	Severe
St. Williams Plot # 5 C	17 543456 4728332	77,100	Severe
St. Williams Plot # 6 A	17 544225 4728549	27,500	Severe
St. Williams Plot # 6 B	17 544225 4728549	27,000	Severe
St. Williams Plot # 6 C	17 544230 4728631	101,200	Severe
Turkey Point Plot # 1 A	17 554276 4727846	100	Light
Turkey Point Plot # 1 B	17 554276 4727846	3,500	Moderate
Turkey Point Park # 1C	17 554293 4727964	300	Light
Turkey Point Plot # 2 A	17 554493 4728147	8,500	Severe
Turkey Point Plot # 2 B	17 554564 4728102	44,400	Severe
Turkey Point Plot # 2 C	17 554625 4728066	24,600	Severe

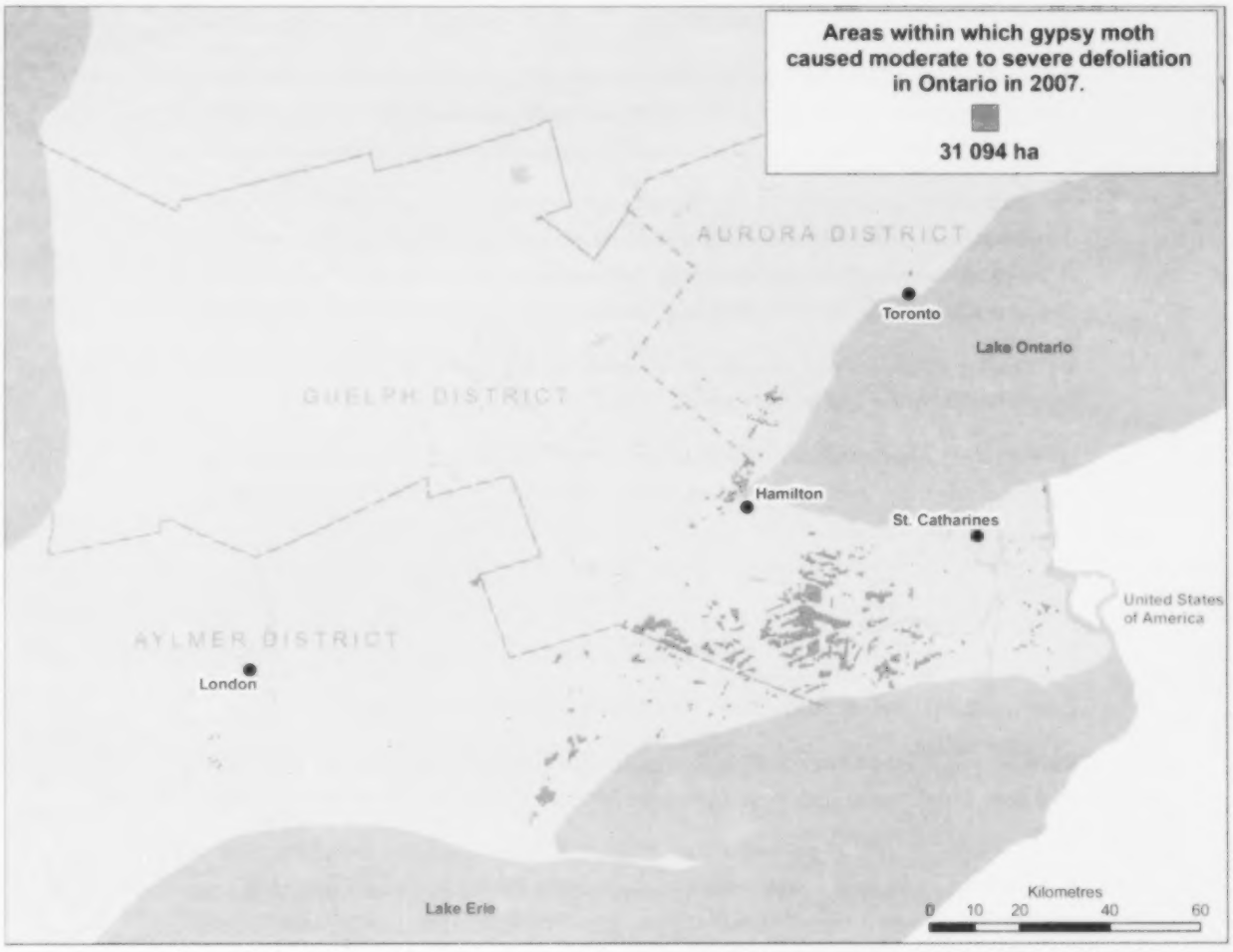


Figure 3.13 Areas-within-which gypsy moth caused moderate-to-severe defoliation in Ontario, 2007

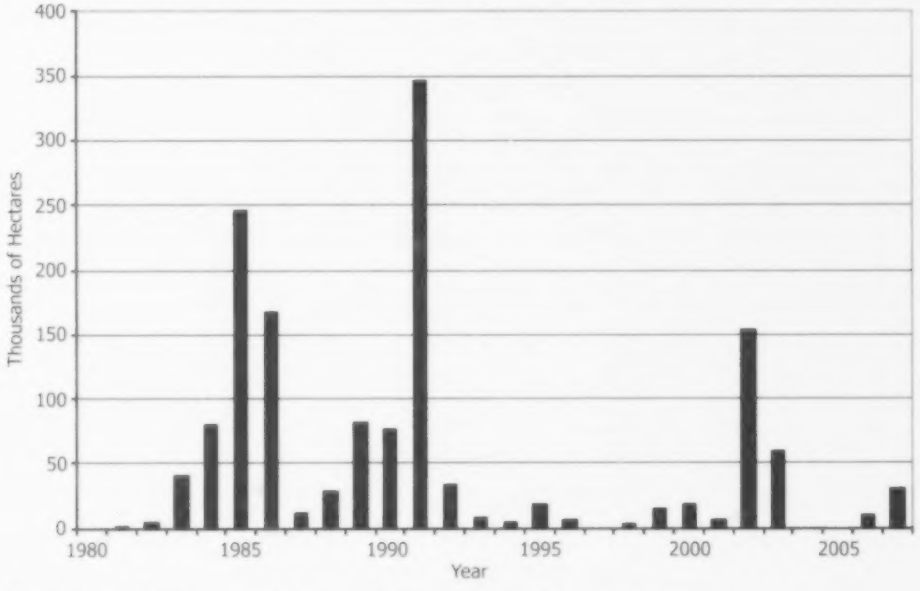
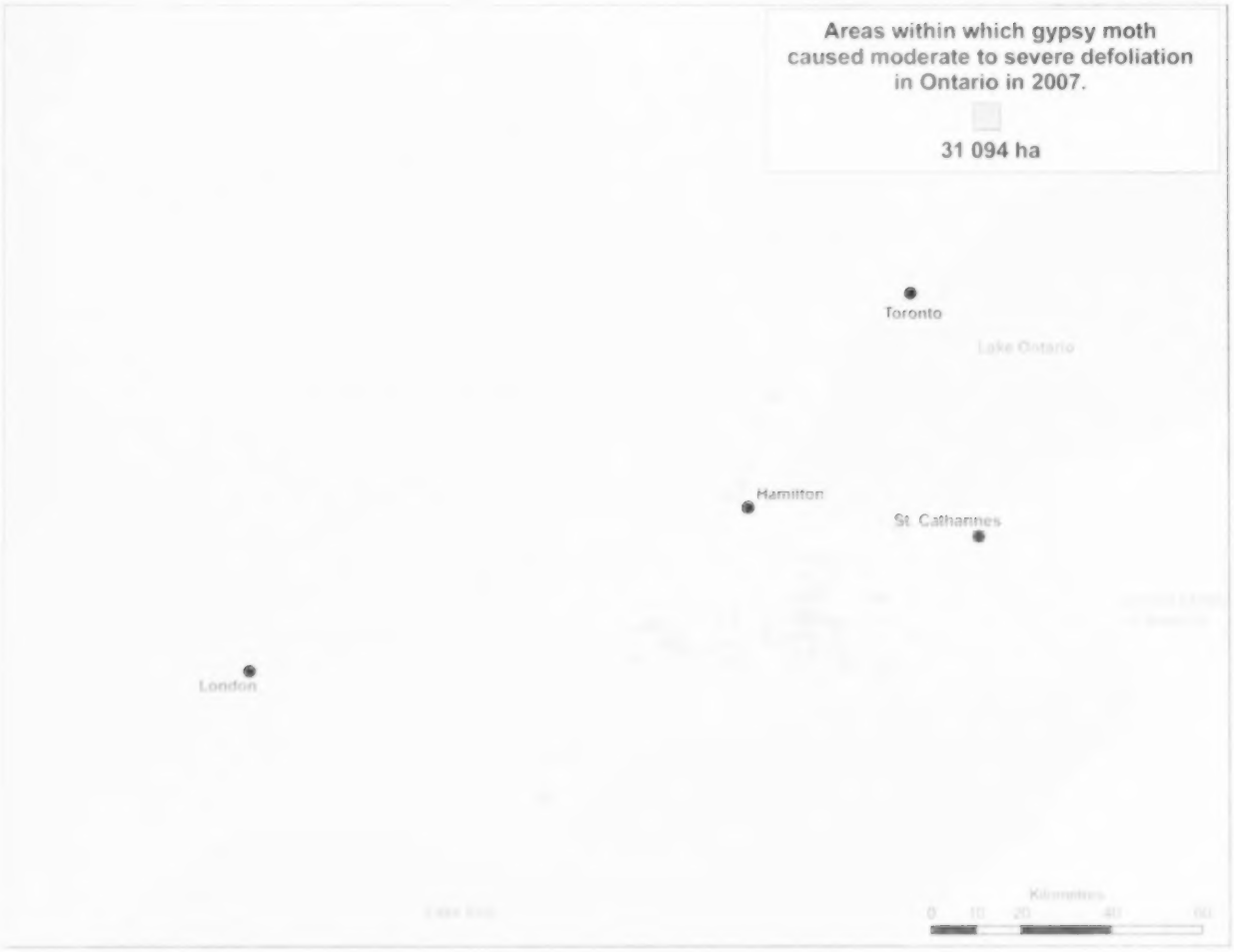
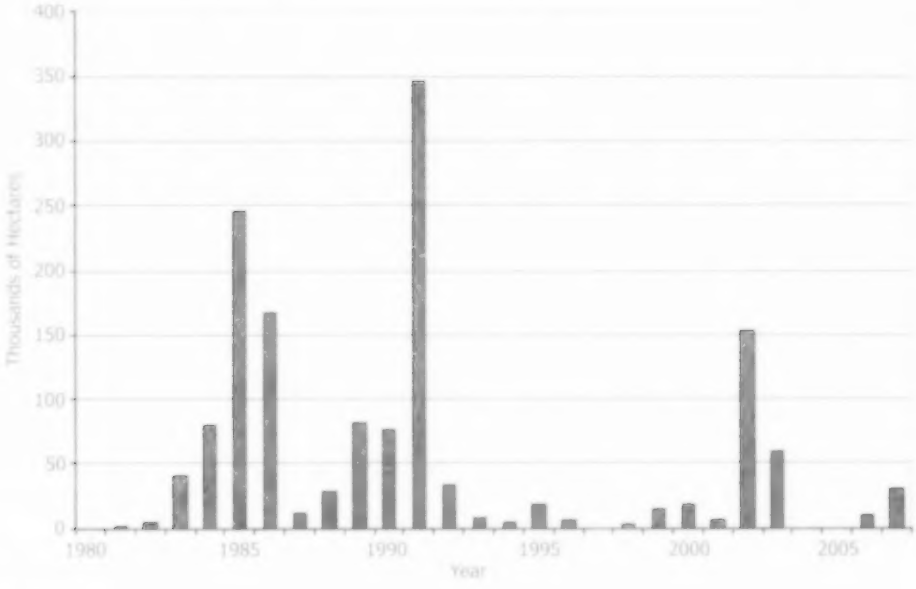


Figure 3.14 Gypsy moth defoliation in Ontario 1980-2007.


Areas within which gypsy moth caused moderate to severe defoliation in Ontario in 2007.
31 094 ha
Toronto
Lake Ontario
Hamilton
St. Catharines
London
Kilometres
0 10 20 40 60


400
350
300
250
200
150
100
50
0
Thousands of Hectares
1980
1985
1990
1995
2000
2005
Year

Early birch leaf edgeminer, *Messa nana* (Klug)

This exotic defoliator, native to Europe, was first detected in North America in 1966 in eastern United States. Shortly after, it was detected along the north shore of Lake Ontario in 1967. Since this time, the insect has spread throughout the Southern Region of Ontario.

The adult sawflies emerge in mid-May to early June, mate and lay eggs. Larvae hatch near the end of May or the beginning of June. From this time to July, defoliation can be detected as the young larvae feed by mining through the foliage. Full-grown larvae drop to the ground and burrow into the humus layer where they spin a cocoon and over-winter.

In 2007, this introduced pest caused light-to-moderate defoliation on young white birch in Kemptville, Pembroke and Guelph districts.

In Kemptville District moderate defoliation occurred in approximately two hectares of forested land at the Agroforestry Centre, Oxford Township. Defoliation was much lighter elsewhere in the region as the Pembroke District had several young white birch trees with low levels of defoliation in Admaston Township, southwest of the Town of Renfrew and again low levels of defoliation on white birch at the Guelph Arboretum in Guelph District.

European pine sawfly, *Neodiprion sertifer* (Geoff.)

This insect was first discovered in the Windsor area in the late 1930's. Today, populations have been become ubiquitous across southern Ontario with satellite infestations occurring in northeastern Ontario.

In 2007, sawfly populations were commonly observed in Kemptville District with severe damage recorded on a small grouping of Scots pine (*Pinus sylvestris* L.) in Ramsey Township. Light damage occurred over a five hectare area in Clarence Township and on young Scots pine in North Elmsley Township.

Japanese beetle, *Popilla japonica* Newm.

Populations of this invasive insect have existed in Ontario since its discovery in the Niagara Peninsula, Southern Region in 1939. Commonly encountered as an exotic horticultural pest, the Japanese beetle will feed on many native tree species as well. In 2007, large populations were reported feeding on basswood (*Tilia americana* L.) and mature American chestnut (*Castanea dentata* (Marsh.) Borkh.) among other herbaceous species at Fanshawe Conservation Area in Aylmer District. Another small population, also in this district, was recorded in the Windsor area feeding on tulip-trees (*Liriodendron tulipifera* L.) at the Ojibway Nature Centre.

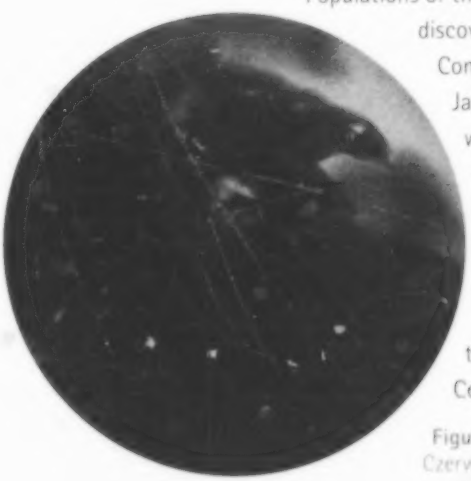


Figure 3.15 Adult Japanese beetle in London Ontario (Photo by E. Czerwinski)

European fruit lecanium, *Parthenolecanium corni* (Bouché)

The European fruit lecanium is a scale insect that occurs on a variety of hardwood hosts. It is often of concern because large populations produce sizeable amounts of honeydew that support the growth of a sooty mold fungus that may cause dieback of twigs and branches with repeated attacks.

In 2007, high numbers of the scale occurred on red oak in Minden Township, Bancroft District and at Wasaga Beach, Midhurst District. High populations were reported throughout Parry Sound District on oak (*Quercus* spp.), ash and maple (*Acer* spp.). Some dieback of planted oak occurred near Bracebrige.

European snout beetle, *Phyllobius oblongus* (L.)

Light damage caused by this exotic defoliator was recorded on sugar maple (*Acer saccharum* Marsh.) in Sault Ste. Marie District, Northeast Region. The infestation seemed to be more common and at higher numbers when compared to 2006 infestations. Most notable populations were observed on ornamental trees within the city of Sault Ste. Marie and in maple stands in and around the town of Echo Bay.

Imported willow leaf beetle, *Plagiodera versicolora* (Laich.)

The imported willow leaf beetle was introduced to North America in 1915 and now has a wide distribution. The feeding of the iridescent blue adult beetles create holes in foliage, while the larvae skeletonize both sides of the leaves. Heavily infested trees become brown as early as mid-June.

This year there was particularly heavy damage reported on large willows along Bronte Creek at Lowville in Halton Region, Aurora District.

Banded elm bark beetle, *Scolytus schevyrewi* (Semenov)

The banded elm bark beetle (BEBB) is an invasive insect indigenous to several Asian countries from China to Russia. Host species within its native range include elm (*Ulmus* spp.), weeping willow (*Salix alba* L.), Russian olive (*Elaeagnus angustifolia* L.) and some fruit producing members of the rose family (Rosaceae). To date this insect is known only to attack elm species in North America.

As part of the United States Department of Agriculture (USDA) Early Detection/Rapid Response Survey, BEBB has been captured in 21 U.S. states. These states include Montana, Minnesota and Michigan, all of which border Canadian provinces and pose a source as a point of entry into Canada.

The simultaneous collection of adult beetles indicates that this species has been established in North America for several years. In 2006, BEBB was unintentionally captured in Medicine

Hat, Alberta, on a Dutch elm disease (DED) (*Ophiostoma ulmi* and *O. novo-ulmi*) trap. BEBB has been confirmed as a vector of DED.

In an effort to determine if BEBB is present in Ontario, the MNR-CFS Forest health monitoring program deployed, monitored and serviced 35 pheromone traps in two "at risk areas" within the province, on behalf of the Canadian Food Inspection Agency (CFIA). Traps were deployed in the Fort Frances District in Northwest Region, and the south western portion of the Aylmer District in Southern Region. These areas were selected because of the high presence of host species, their close proximity to a known infested U.S. state and high traffic border crossings.

While none of these traps caught BEBB, the CFIA did collect the insect in 2007 in Toronto as part of a separate monitoring program for invasive species.

This introduced insect was first found in Ontario in 2005 following its collection in New York in 2004. A survey in 2006 found the insect widespread across much of southern Ontario (Figure 3.16).

European woodwasp, *Sirex noctilio* Fabricus

In order to determine the northern edge of this invasive species' distribution in Ontario, the CFIA contracted with the Ontario Ministry of Natural Resources to conduct a 2007 delineation survey. The survey was supported by field assistance and insect identification by the CFS.

Sites surveyed in 2007 were predominately stands of Scots pine or jack pine, followed by red pine, and then eastern white pine. The survey covered the counties and regional municipalities north of the insect's known distribution (Figure 3.16). Trapping sites were established from Lake Simcoe north through Parry Sound, east to Petawawa, Ottawa, Cornwall to the Quebec border, and north through to the Dubreville, Chapleau, Timmins, Kirkland Lake line (Figure 3.17).

The European woodwasp survey was supplemented in early July by converting pine shoot beetle (*Tomicus piniperda* (L.)) trapping sites to trap for the woodwasp. Fifty of these converted sites were from Sault Ste. Marie to Thunder Bay and west to Fort Frances. Twenty were from Sault Ste. Marie east to North Bay and south along Highways 17, 11 and 69.

A pair of APT Intercept Panel traps and 12-unit Lindgren funnel traps were deployed at each location. All traps were identically baited with an ultra-high release lure containing 70% alpha-pinene (75% of the + isomer and 25% of the - isomer) and 30% beta-pinene (95% of the -isomer). Trap collections and maintenance started on July 9 and continued approximately every two weeks. By October 12 all traps were removed from the field. The trapping period for the survey lasted 14 weeks.

Traps were suspended individually from a rope tightly strung between two trees. The bottom of the trap was approximately 2 m above ground to facilitate access to the collection cup. Collections of insects captured in the trap were done approximately every second week. The lures were replaced once after eight weeks. This year, traps were placed along the sunny edge of woodlands/plantations, rather than in the interior of the stand, which was the

Figure 3.16 Distribution of European woodwasp in Ontario, 2006. Red line indicates northern known distribution.

Figure 3.17 Distribution of European woodwasp in Ontario, 2007.

procedure in 2006. The traps were hung approximately 30 m apart, between two apparently healthy trees.

A total of 985 specimens, representing 9 species of woodwasps (Siricidae), were collected during the survey (Table 3.5). *Sirex noctilio* was found at only 4 locations. A total of 5 specimens of *S. noctilio* were captured at the 4 sites in 4 different counties. The first *S. noctilio* specimens were collected on July 23 and the last was collected on September 20, nearing the end of the trapping period.

The results of the 2007 survey added three new jurisdictions to the known distribution for *Sirex noctilio*, including Hastings County, within Muskoka Regional Municipality; Nipissing District, and the Township of Tehkummah, Manitoulin Island. These finds are in addition to the 2006 survey which found 21 counties positive with European woodwasp, namely: Bruce, Dufferin Regional Municipality, Durham, Elgin, Grey, Norfolk, Halton Regional Municipality, Huron, Kent, Lambton, Leeds and Grenville, Middlesex, Niagara, Northumberland, Peel Regional Municipality, Peterborough, Prince Edward, Simcoe, Waterloo, Wellington and York Regional Municipality. In 2005, *S. noctilio* was found in four counties: Wellington, Durham, Prince Edward and Leeds and Grenville.

Table 3.5 Summary of total number of siricids collected by species, number of sites represented, and date of first and last captures in Ontario, 2007

Woodwasp species collected	Total no. specimens	Total no. sites (n=193)	Date first collected	Date last collected
Sirex nigricornis	432	108	27-Jul	11-Oct
Urocerus cressoni	267	105	10-Jul	28-Sep
Urocerus albicornis	116	55	10-Jul	02-Oct
Sirex nr. juvencus	82	52	12-Jul	10-Oct
Sirex edwardsii	73	37	27-Jul	11-Oct
Tremex columba	6	3	11-Sep	25-Sep
Sirex noctilio	**5**	**4**	**23-Jul**	**20-Sep**
Urocerus gigas flavicornis	2	2	12-Jul	27-Jul
Xeris spectrum	2	2	12-Jul	12-Jul

Pine shoot beetle, *Tomicus piniperda* (L.)

Shoot damage caused by the pine shoot beetle varied considerably as this invasive insect is ubiquitous in pine stands across most of Southern Region. High population levels were encountered in Mulmer Township, Dufferin County and within the District of Midhurst. Shoot damage recurred around the Town of Bracebridge, Parry Sound District where a containment project has been carried out since 2001. Since 1999, the Ontario Ministry of Natural Resources, as part of its Forest Health Monitoring Program, has conducted a pine shoot beetle trapping and population monitoring project from Bracebridge to Sault Ste. Marie along the transportation arteries of Hwy. 11 and 17.

For the seventh consecutive year, Lindgren funnel traps baited with alpha-pinene were placed at 43 locations from Sault Ste. Marie to North Bay, south to Parry Sound and Bracebridge. Also for 2007, an additional 40 sites were trapped in northern Ontario from Sault Ste. Marie to Fort Frances.

None of the 40 northern sites caught pine shoot beetle in 2007. Pine shoot beetle adults were again collected and confirmed north of the initial control site in Bracebridge. Adult beetles were found at points within the administrative districts of North Bay, Sudbury and Sault Ste. Marie; however shoot damage as a result of the feeding by the subsequent generation was once again negligible in these areas.

A range extension for this invasive insect was recorded in 2007. Severe shoot damage (50-65%) was observed on Scots pine near Kearney Lake in Algonquin Provincial Park in the administrative district of Algonquin.

In addition to the survey for this insect, a bait-log program was conducted at select locations in 2007. Three-to-five trap logs one-meter in length were deployed in piles at 30 locations where captures of adult beetles in traps or logs were made in 2006. These logs were collected and pine bark removed to look for the presence of pine shoot beetle. These locations included a small stand of Scots pine west of the Town of Iron Bridge but most were concentrated around original finds near Bracebridge. Visual surveys following the log trapping effort noted a slight increase in crown damage at sites where beetles had been captured in the trap logs.

FOREST DISEASES

Dutch elm disease, *Ophiostoma novo-ulmi* Brasier

Dutch elm disease continues to be a scourge of juvenile elm trees and the occasional mature elm tree that have survived earlier onslaughts of the disease outbreaks in the 20th century. Usually, symptoms of the disease become evident immediately following the first heat wave of the summer. The impact of this disease was wide-spread throughout Southern Region in 2007. It appears that a more virulent strain of the Ophiostoma fungus has been encountered throughout Southern Region where it is not unusual for attacked trees to succumb to the disease in less than a single season. White elm (*Ulmus americana* L.) continue to die across Southern Region from this destructive organism. The rate of spread within a tree and the time it takes to kill the host trees has risen dramatically in the past few years. Widespread mortality even to younger trees has been devastating along fence rows, field edges and abandoned fields. This damage has been prevalent within the districts of Peterborough, Guelph and Aylmer.

Butternut canker, *Sirococcus clavigignenti-juglandacearum*
V.M.G. Nair, Kostichka & Kuntz

Butternut (*Juglans cinerea* L.) trees are being threatened by butternut canker, a disease caused by the fungus *Sirococcus clavigignenti-juglandacearum* (Figure 3.18). The disease was first described in 1967 in Wisconsin but the casual agent was not isolated until 1979. There is much evidence suggesting that the disease has been present and causing butternut decline for some time before it was formally recognized. The origin of butternut canker is unknown. Based on genetic evidence, it is believed that the fungus was introduced to North America.

Figure 3.18 Symptoms of butternut canker in southern Ontario (photo by E. Czerwinski)

In Ontario the disease was first isolated and reported from butternut in 1991. Since then the fungus has been collected across the range of butternut in Ontario (Figure 3.19). A formal survey is scheduled for 2008 to determine butternut health and the impact of the butternut canker.

Following an assessment and status report on butternut in 2003 by the committee on the status of endangered wildlife in Canada (COSEWIC), butternut was officially listed as an endangered species by Environment Canada. It is now protected under the federal Species at Risk Act (SARA). In Ontario butternut is listed as an endangered species under the provincial Endangered Species Act.

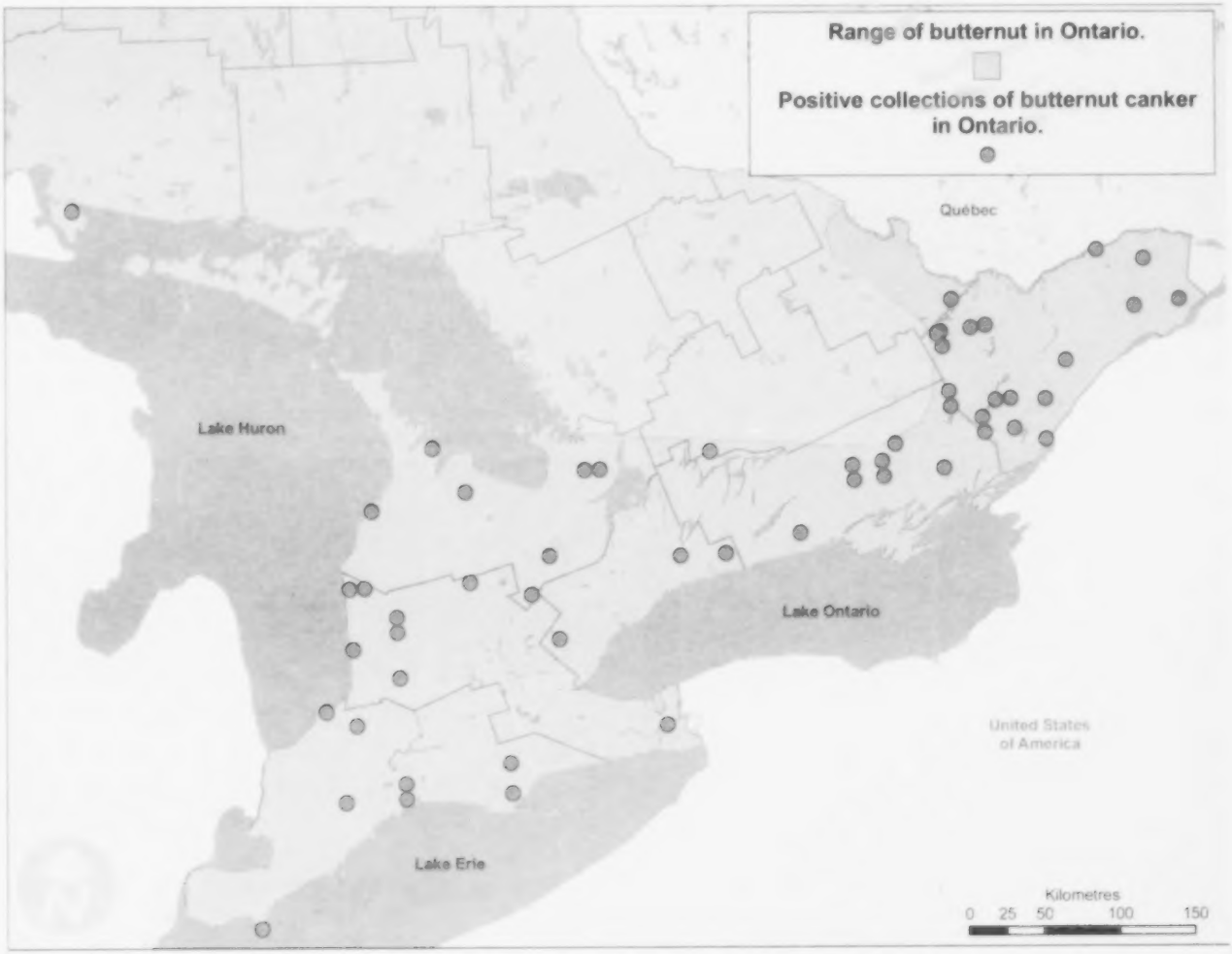


Figure 3.19 Butternut range and positive collections of butternut canker in Ontario


Range of butternut in Ontario.
Positive collections of butternut canker in Ontario.

Northwest Region

M. Francis[1], L. Rowlinson[1], and B. Smith[2]

[1] Ontario Ministry of Natural Resources, Forest Management Branch, Forest Health & Silviculture Section
[2] Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, Sault Ste. Marie

SECTION 4

FOREST INSECTS

Eastern blackheaded budworm, *Acleris variana* (Fern.)

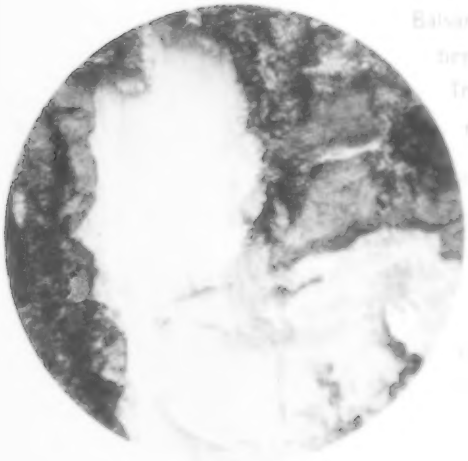
This softwood defoliator has been recorded at various levels in Northwest Region since 2004. Populations appear to have peaked in 2005 and have since declined. In 2007, low levels were detected on white spruce (*Picea glauca* (Moench) Voss) and black spruce (*P. mariana* (Mill.) BSP) in Thunder Bay and Nipigon districts (Figure 4.1). Even at the peak of this recent infestation defoliation was light.

Although the eastern blackheaded budworm has not been much of a problem in Ontario, it has caused severe defoliation in eastern Canada in previous years. The worst case recorded was in the Gaspe Peninsula of Quebec, where an infestation that persisted from 1945 to 1950 completely defoliated many balsam fir (*Abies balsamea* (L.) Mill.) and white spruce trees causing whole-tree mortality.

Correct identification of this pest is important as it is often confused with the eastern spruce budworm (*Choristoneura fumiferana* (Clem.)), the most destructive pest of balsam fir and white and black spruce.

Figure 4.1 Eastern blackheaded budworm on white spruce (photo by M. Francis)

Bronze poplar borer *Agrilus liragus* (B. & B.)



Balsam poplar (*Populus balsamifera* L.) mortality caused by this beetle was first mapped in 2004 in and around the city of Thunder Bay and the southern portion of Ledger Township, north of the town of Nipigon. Two years ago this wood borer made the jump to trembling aspen (*Populus tremuloides* Michx.) and has since begun causing whole tree mortality (Figure 4.2). In 2007 another small pocket of aspen mortality (48 ha) was aerially mapped on the southwest edge of Ledger Township (Figure 4.3).

Figure 4.3 — [illegible]

Bronze poplar borer, *Agrilus liragus* (B. & B.)

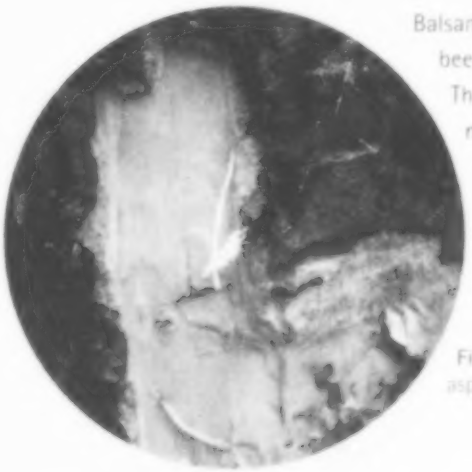


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Figure 4.2 Bronze poplar borer larva and galleries on mature aspen (photo by M. Francis)

Figure 4.3 Areas in which bronze poplar borer caused aspen mortality in Ontario, 2007

Uglynest caterpillar, *Archips cerasivorana* (Fitch)

In 2006 and 2007, nests of this defoliator were recorded south of Thunder Bay along Hwy. 61 and Hwy. 130. Although the uglynest caterpillar is of little economic importance, a number of calls were received from the public indicating curiosity and concern over nests on young chokecherry (*Prunus virginiana* L. var. *virginiana subgenus Padus*) in the area (Figure 4.4).

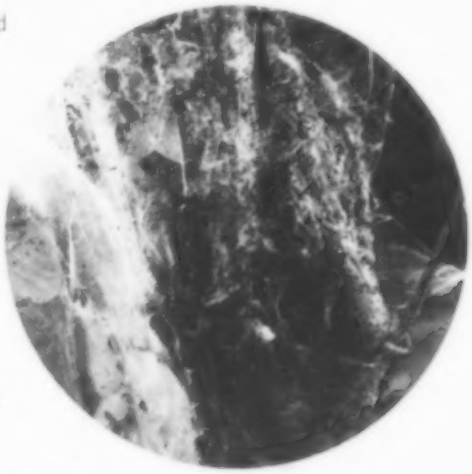


Figure 4.4 Uglynest caterpillars on chokecherry (photo by M. Francis)

Large boxelder leafroller, *Archips negundana* (Dyar)

This pest of Manitoba maple (*Acer negundo* L.) has been defoliating roadside and ornamental trees throughout the towns of Fort Frances, Kenora and Dryden for the last three years. Defoliation levels have varied from 30 - 100%. Many of these trees are also dealing with drought-induced stress from the previous two summers.

Eastern larch beetle, *Dendroctonus simplex* LeC.

In Northwest Region, individual tamarack (*Larix laricina* (Du Roi) Koch) tree mortality was observed in the Town of Roslyn (located west of Thunder Bay) in late August. Closer investigation revealed both adult and larval stages of this species beneath the bark of these trees. Shallow galleries and dark brown boring dust were also present under the bark of the main stem. This attack may have been precipitated by the drought Thunder Bay District experienced in 2007.

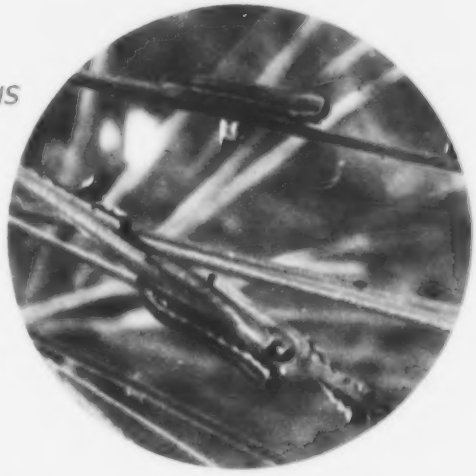
Fall webworm, *Hyphantria cunea* (Drury)

The fall webworm was observed spinning its web in Nipigon, Thunder Bay and Sioux Lookout districts in 2007. This defoliator was found feeding unusually early this year on roadside alder (*Alnus* spp.), young white birch (*Betula occidentalis* Hook.) and cherry (*Prunus* spp.) trees in early August. Populations were also higher than usual in Sioux Lookout District, particularly along the Hwy. 72 corridor near the Town of Sioux Lookout. This pest is more of an aesthetic concern and is highly unlikely to cause mortality in northwestern Ontario, although it has caused mortality in southwestern Ontario.

Pine engraver, *Ips pini* (Say)

In Northwest Region, this opportunistic borer was found killing jack pine (*Pinus banksiana* Lamb.) trees in the Fullerton Lake area (west of Geraldton) in Nipigon District (Figure 4.5). The majority of the mortality was on the north side of Fullerton Lake, but three small pockets were also mapped to the southwest, on the east side of O'Neil Lake. During ground checks, the pine engraver was found to be the primary culprit attacking stressed trees; however the white spotted sawyer beetle (*Monochamus s. scutellatus* (Say)) was also present and contributed to tree mortality. Black spruce trees, which were killed as a result of snow damage in 2004 or 2005, could be the source of this increase in beetle activity.

Figure 4.5 Pine engraver damage on jack pine in the Fullerton Lake area, Nipigon District (photo by M. Francis)



Red pine sawfly, *Neodiprion n. nanulus* Schedl

In 2007, low levels of this pine defoliator were observed in small areas of all three regions in Ontario (Figure 4.6). In Northwest Region, trace defoliation of red pine (*Pinus resinosa* Ait.) was recorded in Thunder Bay District in the Town of Roslyn, located west of the city of Thunder Bay. It was not uncommon to see single colonies on mature trees, but with little defoliation (less than 5%).

Figure 4.6 Red pine sawfly larvae (photo by M. Francis)

Aspen leafblotch miner, *Phyllonorycter ontario* (Free.)

In 2007, the aspen leafblotch miner was found throughout Thunder Bay and Nipigon districts causing moderate damage to young aspen (*Populus* spp.) and light damage to mature aspen. Leaves of some aspen appeared to be scorched (induced by drought), but closer inspection revealed that the aspen leafblotch miner and septoria leaf spot (*Mycosphaerella* spp.) were the actual causal agents. Early leaf drop was seen in late August, giving some stands the appearance that fall had come early.

Early aspen leafroller complex: **aspen leafcurler**, *Pseudexentra oregonana* (Wlsm.) & **darkheaded aspen leafroller**, *Anacampsis innocuella* (Zell.) & **spotted aspen leafroller**, *Pseudosciaphila duplex* (Wlsm.)

In 2007, aspen trees in Northwest Region were attacked by an early season defoliator. Aspen trees with thin, ragged crowns were observed in late May and early June. Closer

inspection revealed that foliage on the affected trees were very tightly rolled and tied together. These trees were in relatively remote locations, and as a result, damage was not detected early enough to observe the causal agents. Although damage was most likely caused by the aspen leafcurler, the darkheaded aspen leafroller and/or the spotted aspen leafroller may have also been involved in defoliation. This infestation occurred over 27,456 ha of Northwest Region (Figure 4.7).

In Kenora District, defoliation totalling 16,371 ha was mapped south of Hwy. 17 in the Kilvert and Hawk lakes area, east of the Town of Kenora. On the eastern side of the district, pockets of defoliation were also observed near Calvin, Fletcher, Roger, Maynard and Wabaskang lakes. Several small pockets were also mapped around the community of Grassy Narrows.

In Red Lake District, moderate-to-severe defoliation totalling 9,157 ha was recorded in the Gullrock Lake area (south of the Town of Red Lake), Barnston, and the Camping Lakes area (west of the Town of Ear Falls). In the south central portion of the district, defoliation was recorded near Wegg and Goose lakes.

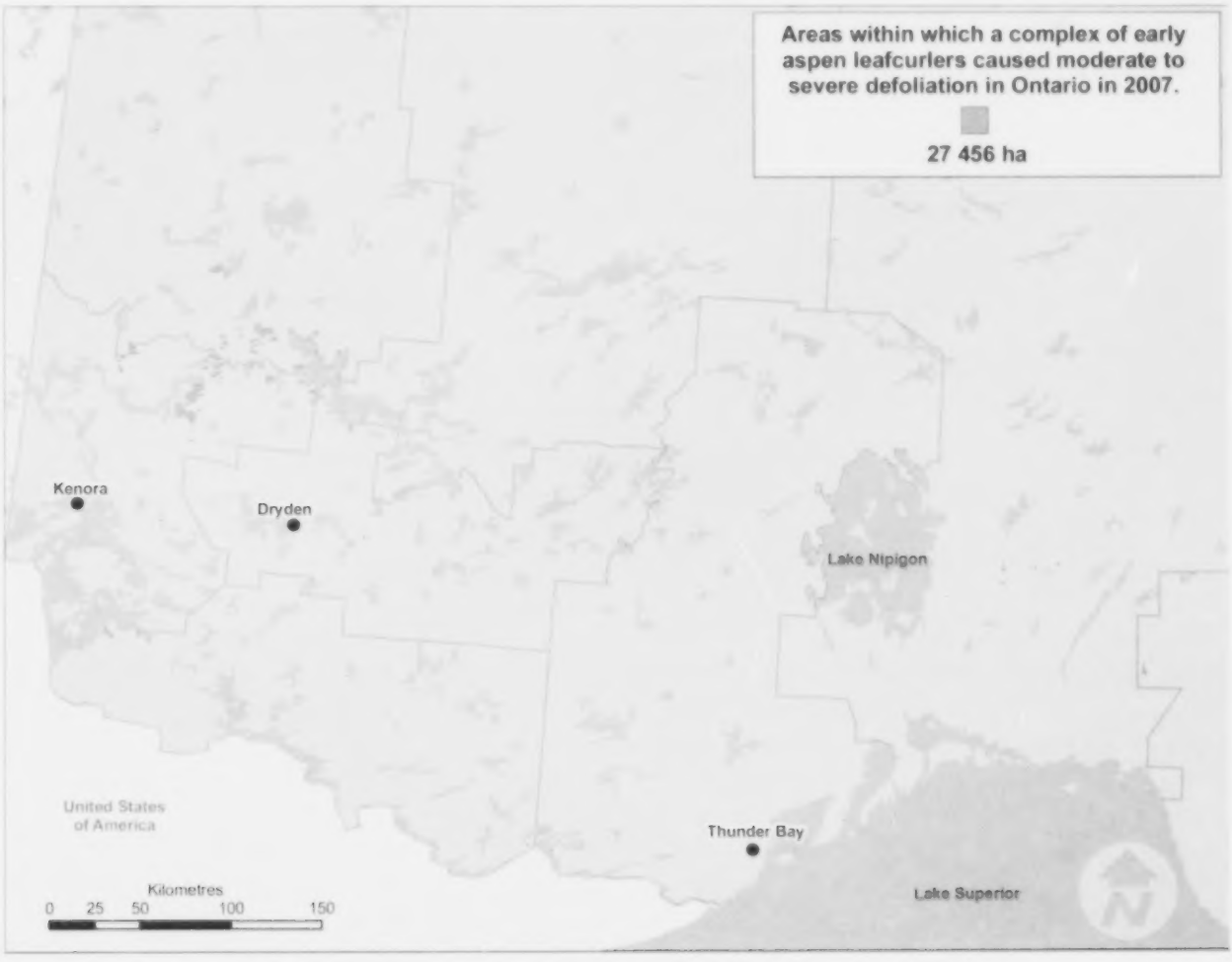


Figure 4.7 Areas-within-which the early aspen leafroller complex caused moderate-to-severe defoliation in Ontario in 2007

inspection revealed that foliage on the affected trees were very tightly rolled and tied together. These trees were in relatively remote locations, and as a result, damage was not detected early enough to observe the causal agents. Although damage was most likely caused by the aspen leafcurler, the darkheaded aspen leafroller and/or the spotted aspen leafroller may have also been involved in defoliation. This infestation occurred over 27,456 ha of Northwest Region (Figure 4.7).

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Dryden and Sioux Lookout districts recorded small, isolated pockets of moderate-to-severe defoliation in 2007. Dryden District reported 202 ha of defoliation on the east side of the Village of Dinorwic, while Sioux Lookout District reported only 49 ha on the southern shore of Minitaki Lake.

Aspen trees looked very thin in the north central portion of Nipigon District in 2007. Upon investigation in mid-June, aspen samples were taken from Goldfield Road, south of Geraldton and along Catlonite Road, south of Long Lac as it appeared that a leaf roller was causing the majority of the damage. A total of 1,124 ha of damage were aerially mapped west of Geraldton in Leduc and Coulter townships as well as south of the Town of Long Lac.

Willow flea weevil, *Rhynchaenus rufipes* (LeC.)

These tiny black weevils emerge in spring and briefly feed on budding leaves. Larvae are leaf miners and feed from June to early September. These mines join together into one large blotch on the upper surface of the leaf, giving it a brown appearance. Mortality is rare and trees normally recover the following spring.

A heavy infestation by the willow leaf weevil in 2007 in the town of Geraldton turned leaves of shining willow trees (*Salix lucida* Muhl. ssp. *lucida*) completely brown in late August.

Pine needle sheathminer, *Zellaria haimbachi* (Bsk.)

This pest is often confused with jack pine budworm (*Choristoneura p. pinus* Free.), as its life cycle and feeding location closely parallels the budworm. Like the jack pine budworm, the pine needle sheathminer emerges in the spring and feeding is usually completed in late June or July. Unlike the budworm, the needle miner spins a mass of silken webbing around the base of needles which are then fed on by mining the base of the needle at the sheath.

Larval feeding caused light-to-moderate defoliation on jack pine trees west of the city of Thunder Bay. Mature pine needle sheathminer larvae were reported hanging from silken threads after wind gusts blew them from their pine needles in late June. This pest is rarely a problem for more than one year.

Jack pine mortality caused by wood borers: **whitespotted sawyer beetle**, *Monochamus s. scutellatus* (Say) & **pine engraver**, *Ips pini* (Say)

Additional jack pine mortality caused by the whitespotted sawyer beetle (Figure 4.8) and the pine engraver were recorded in both Thunder Bay (884 ha) and Nipigon (658 ha) districts in 2007 (Figure 4.9).

Although jack pine mortality was once again recorded in the Armstrong area of Thunder Bay District, numbers have decreased since 2006. Much of this mortality was a consequence of beetle populations that developed in response to snow damage that

occurred back in October of 2001. The combination of a severe windstorm, freezing rain and heavy wet snow caused jack pine trees to be uprooted and tree tops to be snapped. Whitespotted sawyer beetle and the pine engraver moved in to the downed trees and snapped tops. Emerging beetles in 2005 fed on the branches of live jack pine trees causing red flagging on the tree branches. Over 17,000 ha of this damage was aerially mapped in 2005. Since this time jack pine mortality has been mapped in Thunder Bay and Nipigon districts. In 2007, small pockets of new mortality occurred sporadically southwest of the town of Armstrong along the Kopka River, the north side of Windfall Lake, and the south side of North Whalen Lake. A few small areas of new mortality were also mapped north of Armstrong on the southeast side of Caribou Lake.

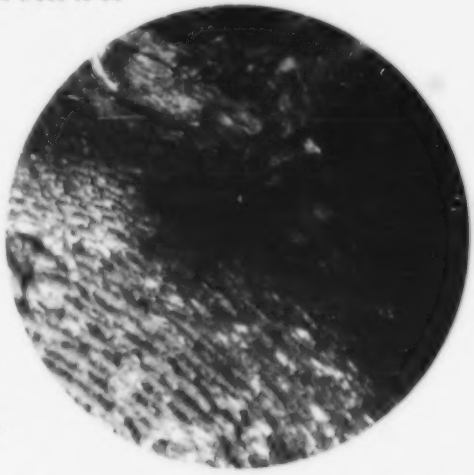

Figure 4.8 Whitespotted sawyer beetle on jack pine (photo by M. Francis)

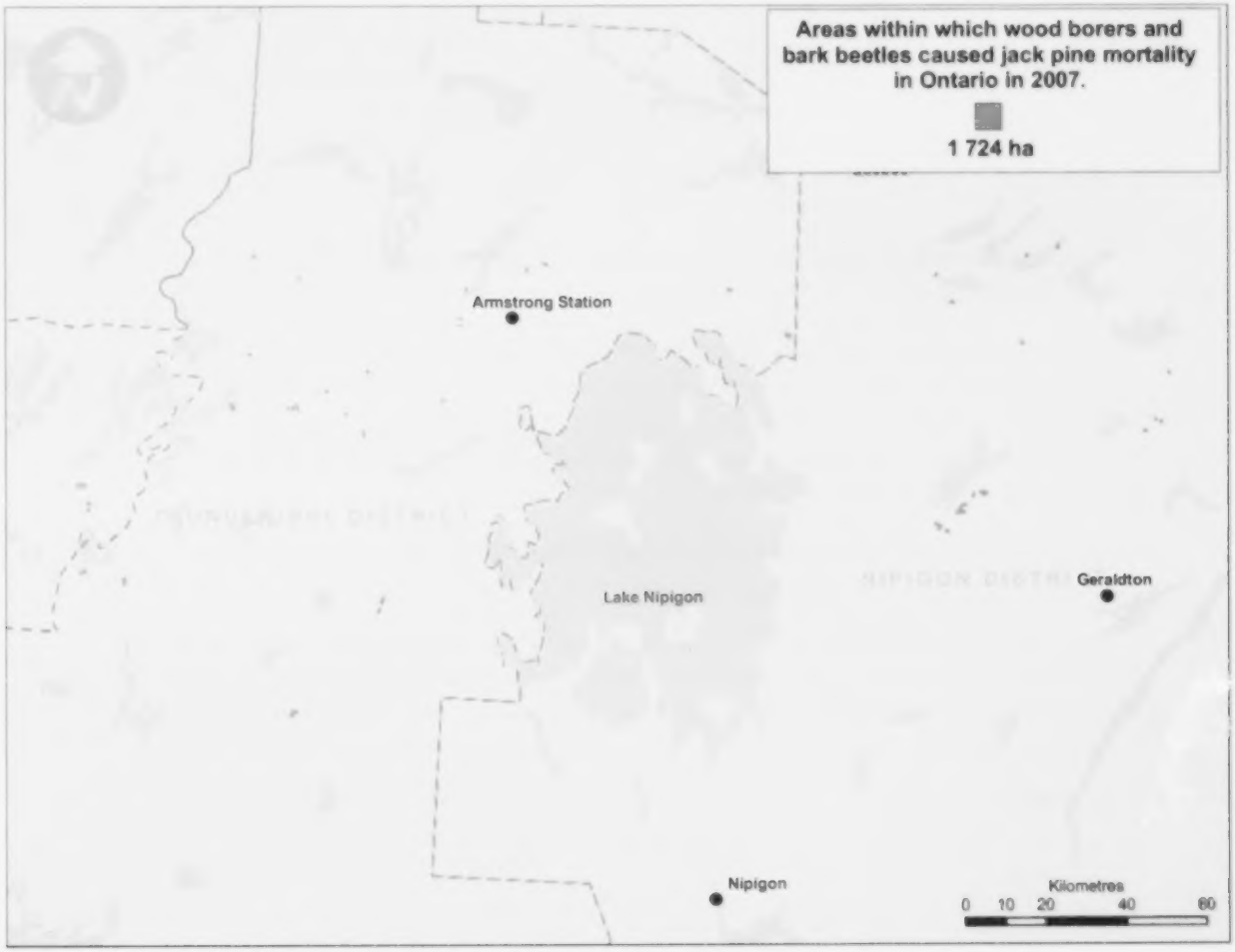

Figure 4.9 Areas-within-which woodborers and bark beetles caused jack pine mortality in Ontario in 2007

In Nipigon District, jack pine mortality caused by these two wood borers was recorded in the Fullerton Lake area in 2007 and was likely caused by snow damage to understory black spruce that occurred 2 to 3 years previously.

FOREST DISEASES

Spruce needle rust, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary var. ledi)

Wet weather in Red Lake District provided optimal growing conditions for spruce needle rust in 2007 (Figure 4.10). Although common throughout the district, the heaviest damage was observed north of the town of Red Lake and west of the town of Ear Falls. Infected needles drop, causing the tree to appear defoliated. Generally there is enough old foliage to maintain tree vigour. It is unusual for infections to occur for two consecutive years on the same tree; therefore the impact of this disease is minimal.

Figure 4.10 Orange spores of spruce needle rust (photo by M. Francis)

Septoria leaf spot, *Mycosphaerella populorum* G.E. Thomps.

During times of wet weather, leaves may develop small brown spots (surrounded by a dark margin) that eventually coalesce into one large brown spot. The fungus overwinters on fallen leaves and will infect new foliage in the spring. Provided the right conditions are available, these newly infected leaves will spread the disease to other unaffected foliage throughout the summer.

This disease seldom causes significant damage to natural stands, but can be a problem in aspen nurseries and plantations.

In August and early September of 2007, balsam poplar trees exhibited the classic symptoms of septoria leaf spot. This disease was recorded in both the Northeast and Northwest regions at low levels on trembling aspen (*Populus tremuloides* Michx.) and high levels on balsam poplar. Premature leaf-drop was observed on heavily infected leaves.

In Northwest Region, this disease was observed across Sioux Lookout, Red Lake, Dryden, Thunder Bay and Nipigon districts and was particularly heavy west of the town of Geraldton.

Needle rust on balsam fir, *Pucciniastrum epilobii* (G.H. Otth)

Like many other rust fungi, the causal fungus for needle rust of balsam fir requires an alternate host (fireweed *Epilobium angustifolium* L.) to complete its lifecycle. This disease only affects the current year's needles and seldom results in tree mortality. However, reduced growth is often a result of infection by this fungus. Foliage of infected fir trees usually turns brown and drops from the tree, making this a particularly significant disease for ornamental and Christmas tree producers.

In 2007, this disease was found in Northwest Region scattered throughout areas west of the town of Ear Falls and north of the town of Red Lake in Red Lake District.

Shoot blight of aspen, *Venturia macularis* (Fr.Fr.) E Mull & Arx

The relatively cold wet spring of 2007 was conducive to the spread of shoot blight of aspen throughout Northwest Region - especially north of Pickle Lake in Sioux Lookout District. This disease is of little economic importance in natural mature stands. However, terminal and lateral shoot deformity or mortality may reduce growth in aspen trees less than five years of age (Figure 4.11).

Figure 4.11 Young aspen showing classic disease symptoms of shoot blight of aspen (photo by D. Rowlinson)

OTHER BIOTIC EVENTS

Squirrel damage, *Tamiasciurus hudsonicus* Erxleben

In correlation with the increased pine cone crop over the last couple of years, the number of red squirrels has increased in Northwest Region. Early in the fall while cones were still green, squirrels collected and cached them in the ground as a source of winter food. Because the cones were deeply attached, large wounds were created when cones were torn away from the twig. This caused the twig beyond the scar to die and turned needles at the end of some jack pine branches red.

Damage was seen across Northwest Region in 2007, particularly in jack pine plantations between 15–25 years old. Plantations hardest hit were north of Atikokan in Fort Frances District and in the Kakabeka Falls area in Thunder Bay District.

FOREST ABIOTIC EVENTS

Ash dieback

In 2007, several inquiries regarding the decline of ash trees (*Fraxinus* spp.) were made by residents of the town of Fort Frances.

Initially residents thought that the emerald ash borer (*Agrilus planipennis* Fairmaire), an invasive alien species, was attacking trees in residential and park areas. Inspections were made and no evidence of this insect was found, although it was quite evident that these trees were declining quickly. Further investigations were inconclusive, but it is suspected that the drought conditions experienced during the summer and fall of 2006 may be the source of the decline. If ash trees experience drought conditions in the fall and enter the winter with a water deficit, whole trees or parts of the crown can die during the winter and not leaf out in the spring. Monitoring and sampling will continue in 2008 to try to determine the cause of this event.

Northeast Region

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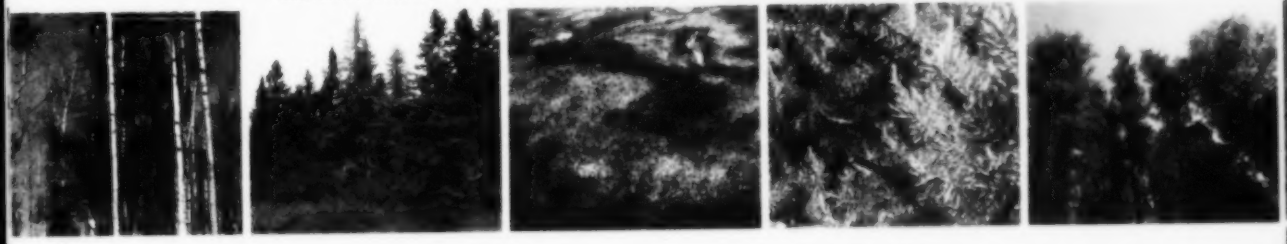

FOREST INSECTS

Oak leafshredder, *Croesia semipurpurana* (Kft.)

Isolated pockets of light defoliation were recorded on red oak (*Quercus rubra* L.) along the ridgeline extending from the town of Thessalon north eastwardly to Elliot Lake in Sault Ste. Marie District.

Eastern larch beetle, *Dendroctonus simplex* (LeC.)

The eastern larch beetle prefers tamarack (*Larix* spp.) and this season, was recorded contributing to mortality at several locations on St. Joseph Island, Sault Ste. Marie District.

Greenstriped mapleworm, *Dryocampa rubicunda* (F.)

Greenstriped mapleworm is commonally seen in large numbers on red maple (*Acer rubrum* L.) from Sault Ste. Marie to Elliott Lake. In 2007 however, only sporadic detections were made for this pest; with the exception of roadside trees along Government Road in Carnarvon Township on Manitoulin Island, Sudbury District.

Elm spanworm, *Ennomos subsignaria* (Hbn.)

In 2007, elm spanworm (Figure 5.1) caused heavy defoliation of ornamental Manitoba maple (*Acer negundo* (L.)) throughout the town of Espanola, Sudbury District. This pest commonly occurs across southeastern Ontario and has been reported as far east as Newfoundland.

Figure 5.1 Elm spanworm and feeding damage in southern Ontario (photo by H. Evans)

Spiny elm caterpillar, *Nymphalis antiopa* (L.)

Many roadside white birch (*Betula papyrifera* Marsh.) were completely defoliated by the spiny elm caterpillar at spot locations throughout the districts of Chapleau, Kirkland Lake and Timmins in 2007.

Serpentine leaf miner, *Phyllocnistis populiella* Cham.

The serpentine leaf miner was regularly observed throughout Chapleau District this season. The area most significantly damaged by this insect was Chappise Township where 80% of the host trees (trembling aspen *Populus tremuloides* Michx.) were moderately affected with their leaves turning grey from heavy mining.

Aspen leafblotch miner, *Phyllonorycter ontario* (Free.)

The aspen leafblotch miner (Figure 5.2) prefers trembling aspen and was particularly common across Chapleau District in 2007. The most notable damage was observed along Hwy. 101 in Ivanhoe Township where 100% of the host trees received 60% foliar damage.

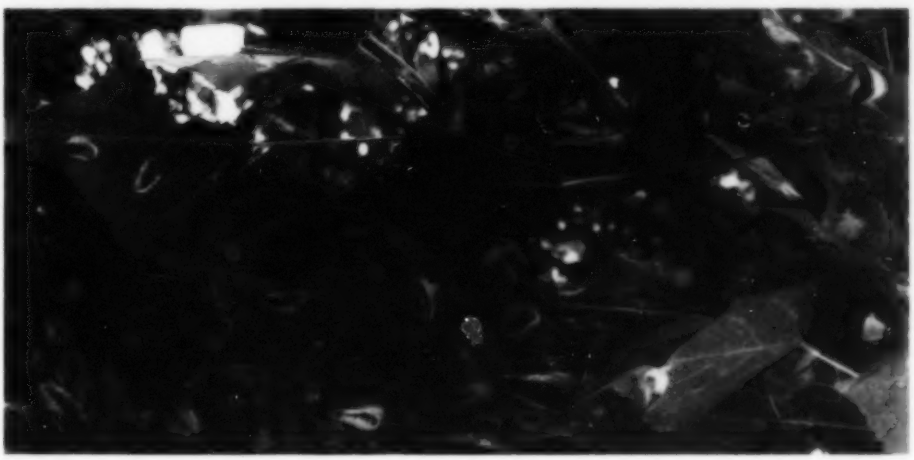

Figure 5.2 Aspen leafblotch miner damage (photo by M. Francis)

Yellowheaded spruce sawfly, *Pikonema alaskensis* (Roh.)

Yellowheaded spruce sawfly (Figure 5.3) severely defoliated white spruce (*Picea glauca* Moench Voss) regeneration along most major highways in Kirkland Lake, Timmins and North Bay districts.

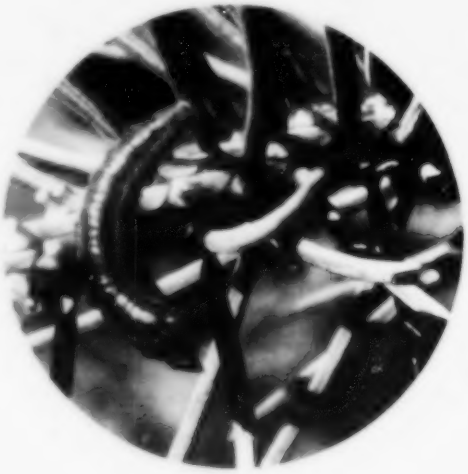

Figure 5.3 Yellowheaded spruce sawfly larva (photo by E. Czerwinski)

FOREST DISEASES

Balsam poplar leaf blight, *Mycosphaerella populicola* G.E. Thomps.

High levels of early foliar browning caused by balsam poplar (*Populus balsamifera* L.) leaf blight occurred throughout Northeast Region beginning in late July (Figure 5.4). As a late season pest, balsam poplar leaf blight is generally thought to have limited impacts on the health of the host trees.

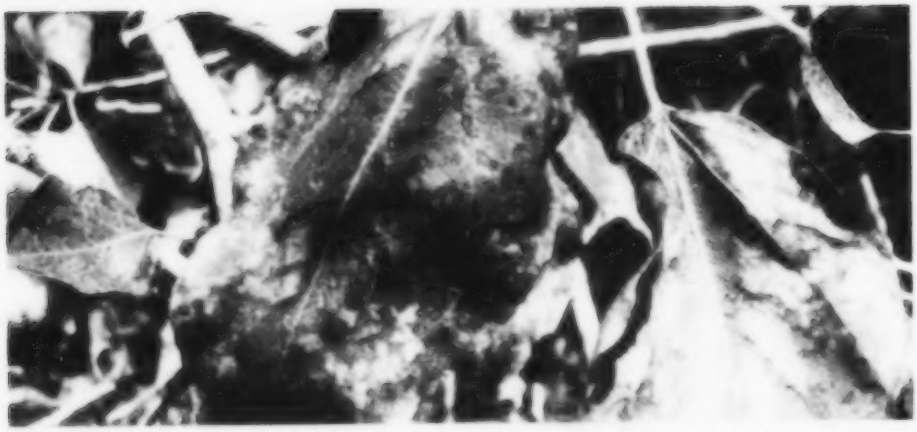

Figure 5.4 Foliar browning caused by balsam poplar leaf blight (photo by A. Keizer)

FOREST ABIOTIC EVENTS

Freezing

In early June temperatures dropped considerably, causing a widespread heavy frost that damaged newly developing shoots. Most of the damage occurred on balsam fir (*Abies balsamea* L.) in sporadic locations throughout the Chapleau District. New shoot mortality of 100% was recorded in some areas.

Southern Region

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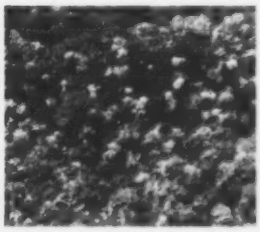
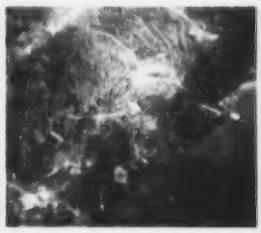
[2] *Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, Sault Ste. Marie*

FOREST INSECTS

Bronze birch borer, *Agrilus anxius* (Gory)

For the third consecutive year bronze birch borer has caused extensive damage in Kemptville District. Population levels continued to increase east of Ottawa into the Hawksbury area, where large groupings of mature dead standing birch are present. Within these stands, both young and mature white birch (*Betula papyrifera* Marsh.) and grey birch (*B. populifolia* Marsh.) were affected, however the impact on grey birch was far more evident along roadways throughout the infested areas.

Metallic borer, *Agrilus masculinus* Horn

This little known and rarely encountered native *Agrilus* beetle was discovered on Manitoba maple (*Acer negundo* L.) causing 40-60% branch mortality in association with coral spot *Nectria* canker (*Nectria cinnabarina* (Tode) Fr.) in Otonabee Township, Peterborough District.

Fall cankerworm, *Alsophila pometaria* (Harr.)

This potentially serious pest was found at several locations within Aurora District in 2007. Defoliation was ubiquitous from west to east with infestations occurring on Manitoba maple in Milton, Georgetown (Halton Hills), Brampton, Woodbridge (Vaughan), Markham

and Oshawa. While the infestation was limited to only a few trees at each location, moderate-to-severe defoliation was recorded on some of the affected trees. Some trees re-foliated as a result of heavy leaf loss. This pest was also found on a variety of hardwood hosts in Mississauga at trace population levels.

Orangestriped oakworm, *Anisota senatoria* (J.E. Smith)

The orangestriped oakworm caused severe defoliation on juvenile bur oak (*Quercus macrocarpa* Michx.) and red oak (*Q. rubra* L.) in the understory of a wooded area within the city of London, Aylmer District (Figure 6.1). Moderate defoliation occurred on mature red oaks within the same stand, leaving the lower branches completely bare.

Figure 6.1 Orangestriped oakworm feeding on red oak foliage (photo by P. Hodge)

Pine spittlebug, *Aphropora cribrata* (Wlk.)

Populations of this unsightly pest developed throughout Pembroke and Kemptville districts on Scots pine (*Pinus sylvestris* L.), jack pine (*P. banksiana* Lamb.) and eastern white pine (*P. strobus* L.). In 2007, high levels of twig dieback occurred in Hagerty Township, Pembroke District and in Bastard, Ramsay and Clarence townships, Kemptville District. The heaviest damaged area occurred in Clarence Township with moderate levels of damage affecting a two hectare pine stand.

Birch sawfly, *Arge pectoralis* (Leach)

A localized birch sawfly infestation was recorded in Guelph District in 2007. This infestation was documented in early August as larvae were observed feeding on white birch at Laurel Creek Conservation in the city of Waterloo. Birch sawfly populations are capable of sporadic or localized injury to trees and shrubs and therefore are of moderate importance to forest health.

Cedar leafminer, *Argyresthia* spp.

Cedar leafminer caused 29,986 ha of moderate-to-severe defoliation to eastern white cedar (*Thuja occidentalis* L.) south of Ottawa, Kemptville District in 2007 (Figure 6.2). Repeated damage has persisted for several years, and as a result excessive top mortality and some whole tree mortality has occurred in the area. Elsewhere in Southern Region, increased populations were recorded in Midhurst and Aylmer districts.

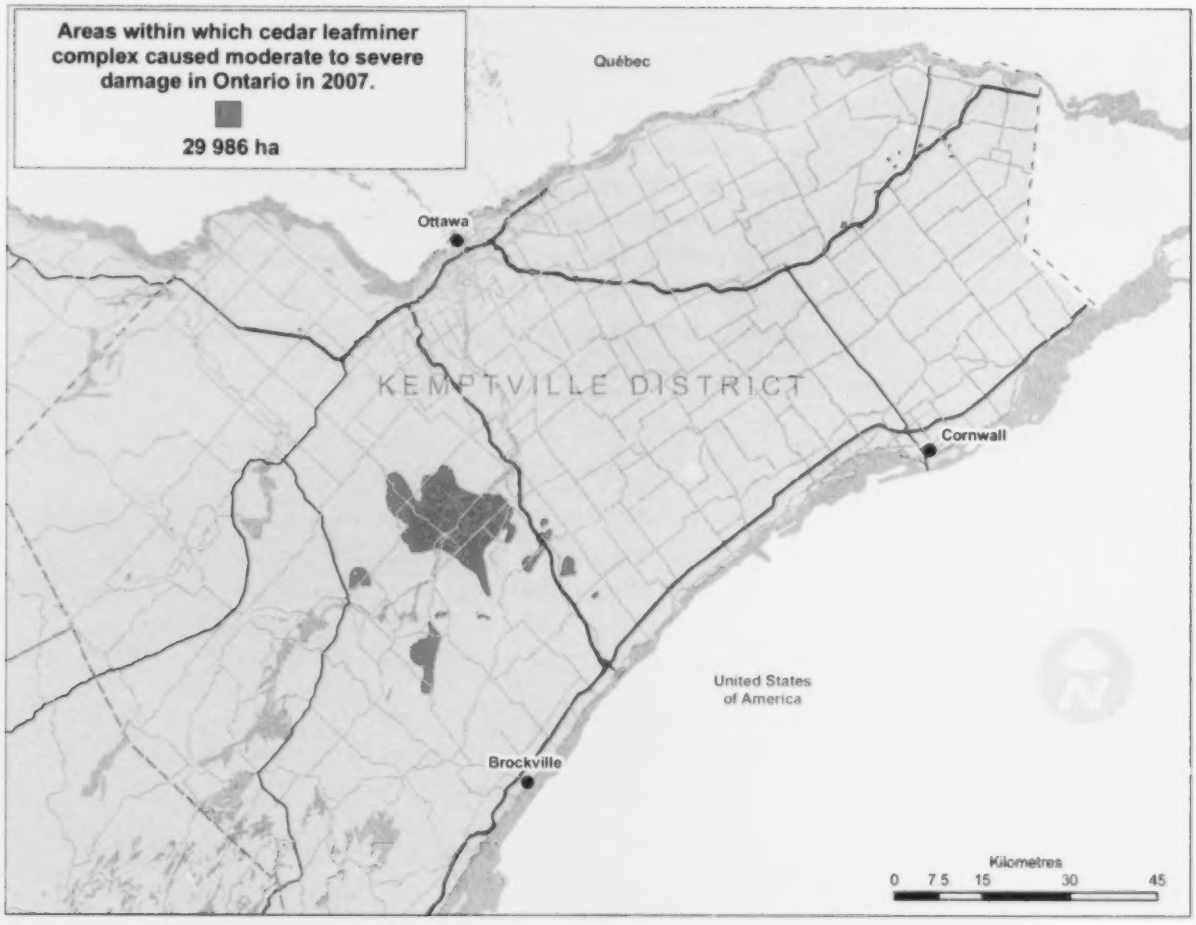


Figure 6.2 Areas-within-which cedar leafminer caused moderate-to-severe defoliation in 2007

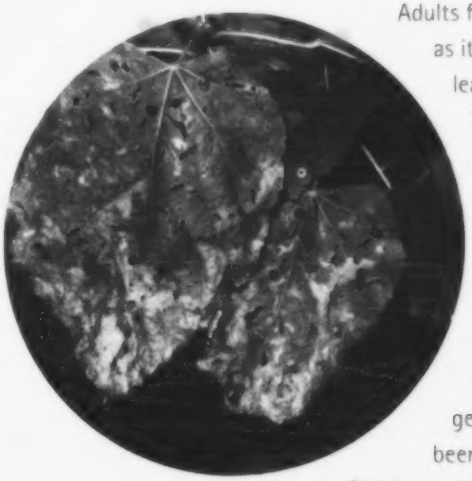
Hickory leafroller, *Argyrotaenia juglandana* (Fern.)

Despite large populations of this insect in Guelph and Aylmer districts in 2006, infestations of hickory leafroller completely collapsed in 2007. This allowed affected hickory trees of several species (*Carya* spp.) to regain lost vigour.

Although most of the population crashed, small infestations were discovered in the Caledonia area, Guelph District causing light damage on bitternut hickory (*Carya cordiformis* (Wangenh.)) in a stand approximately two hectares in size.

In Aurora District, the hickory leafroller caused moderate-to-severe damage in the wooded areas in the north end of Oakville, and caused light-to-moderate damage at Bidwell Trail Common in Mississauga. Shagbark hickory (*Carya ovata* (Mill.) K. Koch.) was the host in these cases.

Basswood leafminer, *Baliosus nervosus* (Panz.)



Adults feed early in the year by skeletonizing young leaf tissue as it unfolds from the bud stage. Larvae mine within the leaves, leaving the typical brown blotchy effect on the leaf. The combined effect of adult and larval feeding, when populations are high, can cause the trees to appear quite brown. Pupation occurs within the newly developed mine; after adults emerge they feed again by skeletonizing any green basswood (*Tilia americana* L.) foliage available.

Figure 6.3 Basswood leafminer damage in Midhurst District (photo by H. Evans)

Basswood leafminer populations remained in the same general areas as reported in 2006. This leafminer has now been recorded for several years in the central part of Midhurst District and in scattered locations throughout Dufferin, Grey and Bruce counties. This insect has reached its potential range to the west as it was found at Inverhuron Provincial Park on the shores of Lake Huron. Moderate-to-severe defoliation was also recorded at the St. Williams Conservation Reserve, Aylmer District.

Throughout the Southern Region, browning was heaviest on regeneration and in the lower crowns of larger trees (Figure 6.3). At some locations the progression of attack reached close to the tops of the upper crown where heavy premature leaf drop was evident.

Obliquebanded leafroller, *Choristoneura rosaceana* (Harr.)

Infestations of the oblique banded leafroller were noted on a few occasions in the Southern Region throughout the 2007 field season. Known to be a major threat to apple orchards, this pest also contributes to defoliation in forest stands or woodlots. A low population caused light defoliation in a juvenile white ash (*Fraxinus americana* L.) stand in the Ruigrok Tract Conservation Area, outside the community of Caledonia, Guelph District.

Two other locations both in Pembroke District were also defoliated by the oblique banded leafroller in combination with the oak leaf shredder (*Croesia semipurpurana* (Kft.)) and possibly other leaf feeders (see the following page for details).

Balsam poplar leaf beetle, *Chrysomela walshi* Brown

This persistent pest of balsam poplar (*Populus balsamifera* L.) has been recorded in Kemptville and Pembroke districts. In 2007, low levels of damage were recorded on trees across the northern portion of both districts. This damage, combined with the septoria leaf spot (*Mycosphaerella populorum* G.E. Thomps.), which has also been recorded throughout the Bancroft District, caused an early leaf drop for balsam poplar.

Oak defoliator complex: oak leafshredder *Croesia semipurpurana* (Kft.) & **obliquedbanded leafroller,** *Choristoneura rosaceana* (Harr.)

For the second consecutive year, a complex of insects including the oak leafshredder, the obliquedbanded leafroller and other leaf feeders caused defoliation to red oak in the Pembroke area. The affected trees occurred on rocky hilltop locations in the Barron River area, town of Laurentian Hills. The total area affected was 225 ha. Lighter damage occurred in the surrounding area (Figure 6.4).

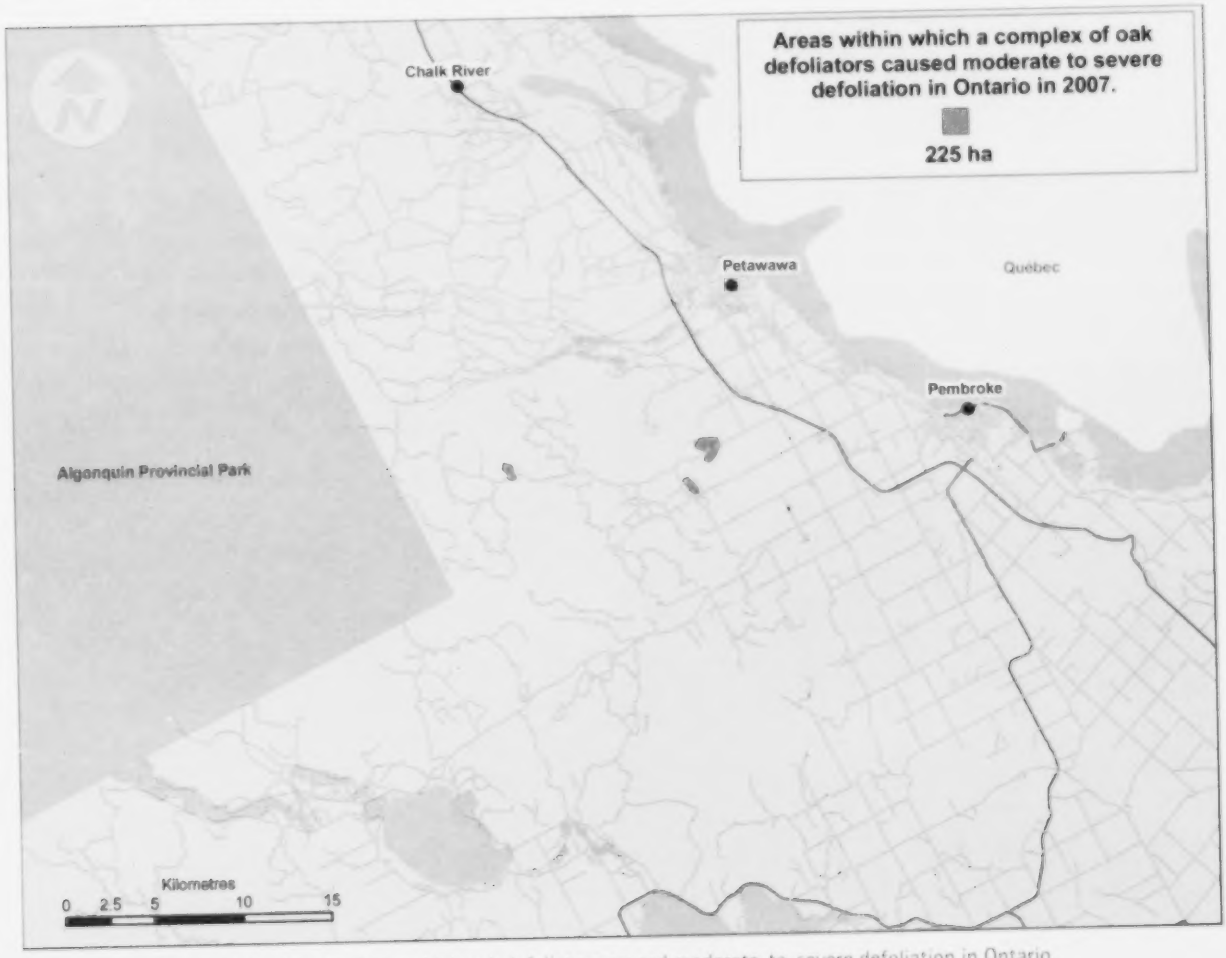


Figure 6.4 Areas-within-which oak defoliators caused moderate-to-severe defoliation in Ontario, 2007

Fall webworm, *Hyphantria cunea* (Drury)

Population levels of the fall webworm have been on the rise over the past two years in Southern Region (Figure 6.5). In 2007, this trend subsided as the area of defoliation decreased considerably from 319 ha in 2006, to a mere 32 ha in 2007. Notable infestations in Southern Region occurred in Aylmer (Figure 6.6), Parry Sound, Midhurst and Guelph

Oak defoliator complex: oak leafshredder *Croesia semipurpurana* (Kft.) & obliquedbanded leafroller, *Choristoneura rosaceana* (Harr.)

For the second consecutive year, a complex of insects including the oak leafshredder, the obliquedbanded leafroller and other leaf feeders caused defoliation to red oak in the Pembroke area. The affected trees occurred on rocky hilltop locations in the Barron River area, town of Laurentian Hills. The total area affected was 225 ha. Lighter damage occurred in the surrounding area (Figure 6.4).

Figure 6.4 Areas within which a complex of oak defoliators caused moderate to severe defoliation in Ontario in 2007.

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districts. In Parry Sound District, numerous infestations consisted of one or two tents per tree. Only on one occasion was there complete defoliation of a tree's foliage; this occurred in a pocket of juvenile ash species.

In Midhurst District, high population levels caused severe defoliation in many areas especially in the north end of Simcoe County. A number of deciduous species were also infested in this area, although ash was more often damaged and in some cases completely defoliated.

Figure 6.5 [illegible]

Infestations were prominent throughout Aylmer and Guelph districts at many satellite locations occurring predominantly along roadsides and along the outer perimeter of wooded areas. Aerial surveys detected 23 ha of moderate-to-severe defoliation on forested land in Point Pelee National Park (Figure 6.7) on a variety of deciduous species, particularly black walnut (*Juglans nigra* L.), with an additional nine hectares of light damage north of the park. At this location, ground surveys showed light levels of defoliation with the occasional moderately-to-severely defoliated tree.

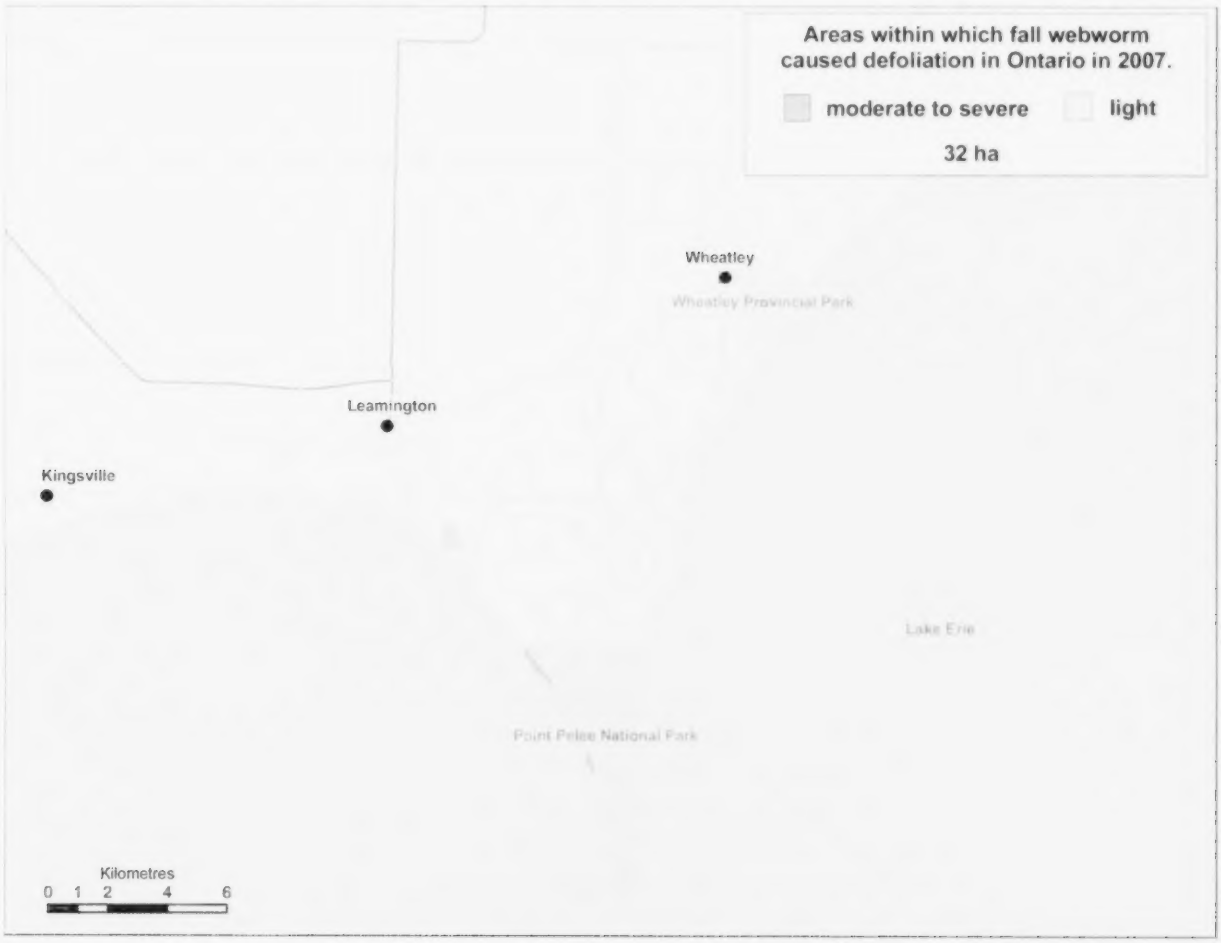

Figure 6.6 Areas within which fall webworm caused defoliation in Ontario in 2007

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Figure 6.5 Fall webworm caterpillars and nest (photo by M. Francis)

Infestations were prominent throughout Aylmer and Guelph districts at many satellite locations occurring predominantly along roadsides and along the outer perimeter of wooded areas. Aerial surveys detected 23 ha of moderate-to-severe defoliation on forested land in Point Pelee National Park (Figure 6.7) on a variety of deciduous species, particularly black walnut (*Juglans nigra* L.), with an additional nine hectares of light damage north of the park. At this location, ground surveys showed light levels of defoliation with the occasional moderately-to-severely defoliated tree.

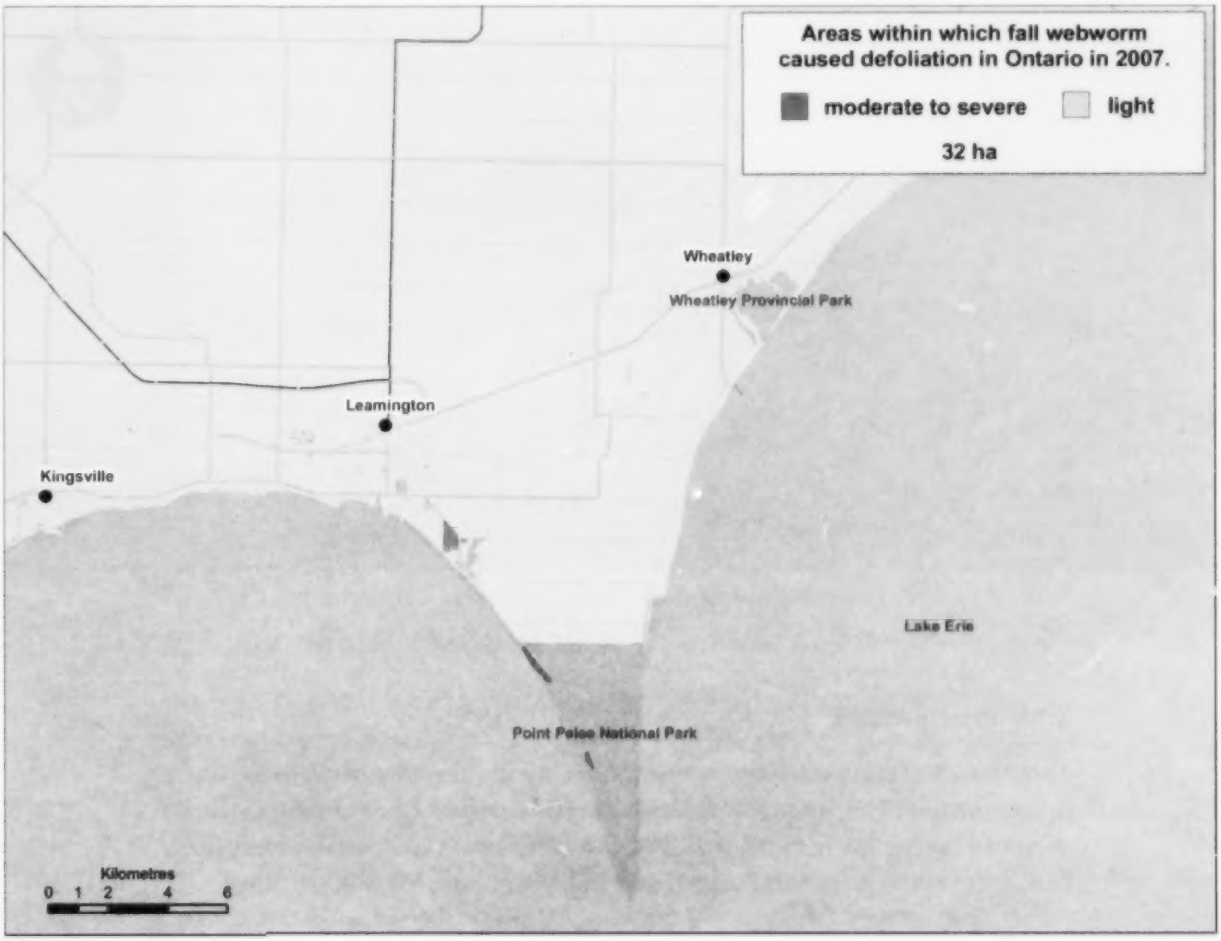


Figure 6.6 Areas-within-which fall webworm caused defoliation in Ontario in 2007

Figure 6.7 Moderate-to-severe defoliation by fall webworm in Point Pelee National Park (photo by E. Czerwinski)

Pine engravers, *Ips grandicollis* (Eich.) & *Ips pini* (Say)

The southern pine engraver, a destructive pest of pine (*Pinus* spp.) trees throughout Southern Region, was recorded in Peterborough and Guelph districts in 2007. Major weather events, such as windstorms and prolonged drought-like conditions can cause high levels of stress, and as a result attract many different *Ips* spp. as well as other bark beetles and wood borers. In Guelph District, high populations were noted west of Dunnville, Canborough Township infesting mature jack pine, Scots pine and eastern white pine. Infestations of pine engraver, (*Ips* pini (Say)) were recorded on mature eastern white pine on Belle Isle, Stoney Lake, Duro and Dummer Township, Peterborough District.

Oystershell scale, *Lepidosaphes ulmi* (L.)

In 2007, high populations of oystershell scale (Figure 6.8) were recorded in Bancroft and Parry Sound districts. In Parry Sound District, high numbers of this insect caused varying degrees of crown dieback and branch mortality in pockets of American beech (*Fagus grandifolia* Ehrh.). In Bancroft District, the scale caused moderate levels of twig and branch mortality as far east as Bon Echo Provincial Park, in the Mazinaw Lake area.

Figure 6.8 Oystershell scale on American beech (photo by H. Evans)

Eastern tent caterpillar, *Malacosoma americanum* (F.)

This caterpillar is often found along roadsides and forest edges feeding on a variety of cherry (*Prunus* spp.) and shrub species (Figure 6.9). Population levels fluctuate from year to year, with occasional outbreaks occurring every few years. In 2007, in all but two districts in Southern Region eastern tent caterpillar populations were observed to be at a high level. Populations, however were not as evident in Parry Sound and Kemptville districts as in previous years.

Figure 6.9 Eastern tent caterpillar nest (photo by P. Hodge)

Balsam fir sawfly, *Neodiprion abietis* (Harr.)

This sawfly is capable of severely damaging trees and shrubs (Figure 6.10). Populations were discovered defoliating balsam fir (*Abies balsamea* L.) at both Sauble and Wasaga beaches, Midhurst District, Southern Region. While most damage ranged from light to moderate, some cases reached 100 percent defoliation.

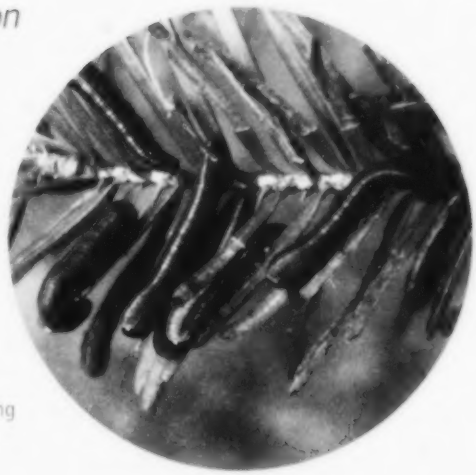


Figure 6.10 Balsam fir sawfly larvae feeding in southern Ontario (photo by H. Evans)

Redheaded pine sawfly, *Neodiprion lecontei* (Fitch)

In Bancroft District, high population levels of this insect caused an average of 40 percent defoliation on 60 percent of the trees in a two hectare immature red pine plantation in Hastings Highlands Township. Low numbers were also recorded on n..ture shoreline trees near Mazinaw Lake, Bancroft District as well as on the Canadian Forces Base Borden, Midhurst District.

Jack pine sawfly, *Neodriprion pratti paradoxicus* **Ross** & **red pine sawfly**, *Neodiprion nanulus nanulus* Schedl

Light defoliation, caused by one or both of these sawflies, was recorded on semi-mature jack pine in Richards Township, Pembroke District and in Bastard and Rideau townships, Kemptville District. Infested trees were left with very thin foliage and in poor health.

Spiny elm caterpillar, *Nymphalis antiopa* (L.)

Population levels of this caterpillar increased from 2006 levels in Pembroke District, as many isolated groups of defoliated willow (*Salix* spp.) were recorded in Wylie Township and along Basin Depot Road north of Bonnechere Airstrip, Sherwood Township. In many cases populations were recorded on isolated ornamental trees.

Maple leafcutter, *Paraclemensia acerifoliella* (Fitch)

Over the past few years population levels of this insect have fluctuated in Peterborough and Bancroft districts, with forested areas sustaining up to 5,549 ha of damage (2005). In 2006, a population crash occurred and infestations were restricted to a few locations within Bancroft District.

This year high populations of the maple leafcutter recurred in Bancroft District as sugar maple (*Acer saccharum* Marsh.) stands sustained severe defoliation in the Palmerston Lake area, North Frontenac County and moderate-to-severe defoliation in Effingham Township.

Yellowheaded spruce sawfly, *Pikonema alaskensis* (Roh.)

Populations of the yellowheaded spruce sawfly are very common throughout the range of white spruce (*Picea glauca* (Moench) Voss) in Ontario. In 2007, this insect was recorded in Aurora and Aylmer districts, Southern Region. In Aurora District, damage to roadside trees and ornamental spruce were recorded in the Vaughan area and along Hwy. 404 in Richmond Hill. In Aylmer District, a small infestation was recorded showing light damage south of St. Mary's in a young white spruce stand.

Peach bark beetle, *Phloeotribus liminaris* (Harris)

The peach bark beetle is a known pest of peach (*Prunus persica* (L.) Batsch) and cherry orchard trees, but has been found only to infest black cherry (*Prunus serotina* Ehrh.) trees in forested areas in the United States. In 2007, this native insect was discovered infesting black cherry for the first time in Ontario.

Adult beetles emerge from overwintering galleries created just under the bark in the phloem of live black cherry trees. The tree's natural defense is to pitch the beetles out from the cambial layer by excreting a gummy sap that forces the insect out (Figure 6.11). This gum can be seen in the

Figure 6.11 Oozing sap from wounds on black cherry caused by the peach bark beetle (photo by P. Hodge)

fall or spring as light coloured masses on the outside of the bark and in extreme cases on the forest floor, as the gum falls and accumulates at the base of an infested tree.

Fifteen infested mature black cherry trees were found near the town of Atwood, Perth County, Guelph District in a woodlot comprised primarily of maple and ash, with small pockets of cherry and beech.

Pine gall weevil, *Podapion gallicola* Riley

This insect was noted at high levels in many red pine stands in the Midhurst and Aurora districts. The pine gall weevil causes abnormal swellings on the branches of red pine and is of common occurrence in thinned semi-mature and mature plantations in Southern Region.

Larch sawfly, *Pristiphora erichsonii* (Htg.)

Large populations of this insect can completely defoliate and severely damage tamarack (*Larix laricina* (Du Roi) K. Koch), by causing branch or whole tree mortality. Mortality often follows attack by secondary pests such as the eastern larch beetle (*Dendroctonus simplex* LeC.) which are attracted to the weakened tree. In 2007, the larch sawfly caused severe defoliation from Wallace through to Maynooth, South Algonquin Township, Bancroft District.

Flat leaftier, *Psilocorsis reflexella* Clem.

High populations of the flat leaftier in conjunction with the striped oak webworm (*Pococera expandens* (Wlk.)) and an oak micro moth (*Coleotechnites quercivorella* (Cham.) caused moderate-to-severe defoliation to red oak near Dorset, Algonquin Highlands Township, Bancroft District.

Hickory bark beetle, *Scolytus quadrispinosus* Say

This native insect is considered to be the most destructive pest of hickory (*Carya* spp.) species in North America. It was first reported to be causing landscape-level tree mortality and decline in Aylmer and Guelph districts in 2001. From 2001 to 2005 all hickory trees within an area of 344,982 ha were considered dead or declining. Spread of the beetle has been restricted to this area due to limitations in the natural range of hickory. However, populations continued to build within the infested area in 2006 and 2007.

In many instances hickory has reached 100% mortality and ash species appear to be filling the understory of these open canopy woodlots (Figure 6.12). The future of these woodlots is now in question as emerald ash borer (*Agrilus planipennis* Fairmaire) infestations are present in nearby areas.

Figure 6.12 Hickory mortality north of London, Ontario (photo by L. Tucker)

Basswood thrips, *Sericopthrips tiliae* Hood and **Introduced basswood thrips**, *Thrips calcuratus* Uzel

For the fourth consecutive year, two species of basswood thrips caused significant damage to all age classes of American basswood (*Tilia americana* Marsh.) throughout the southern and eastern portion of Peterborough District (Figure 6.13).

The introduced basswood thrips (*Thrips calcaratus* Uzel) is most likely the causal agent of the majority of the damage. Foliar damage was recorded at moderate-to-severe levels on host trees through most of Peterborough District and north into the southern portion of Bancroft District.

The native basswood thrips (*Serciothrips tiliae* Hood) can be found on the foliage later in the summer. This species of thrips may have contributed to the damage recorded in 2007. Repeated defoliation leads to thinned crowns and branch dieback, and eventual reduction in radial growth.

Figure 6.13 Basswood thrips damage in southern Ontario (photo by E. Czerwinski)

Maple leafroller, *Sparganothis acerivorana* MacK. & **maple-basswood leafroller**, *Sparganothis pettitana* (Rob.)

Small populations of the maple leafroller were noted in both Pembroke and Kemptville districts causing low levels of foliar damage. Semi-mature sugar maples were discovered

with light levels of damage particularly on the lower branches in Lanark Township, Kemptville District. Similar levels of damage were recorded on semi-mature red maple (*Acer rubrum* L.) in Algonquin Park.

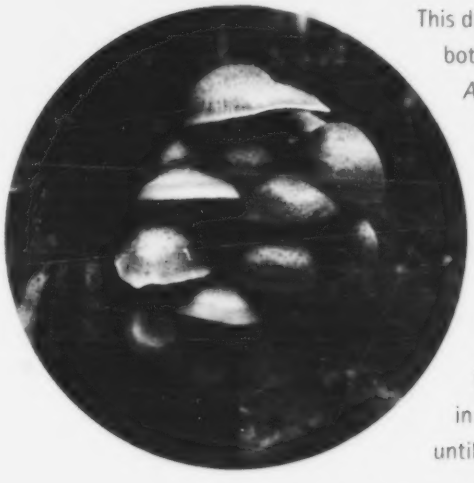
In Aurora District, small populations of the maple-basswood leafroller were detected causing light damage on several sugar maple stands within the Regional Municipality of York, Aurora District.

Pine needle sheathminer, *Zellaria haimbachi* Bsk.

In 2007, a two hectare stand of semi-mature jack pine received light damage to its current year's growth in Marlborough Township, Kemptville District. Within this area, a smaller section of juvenile trees (0.5ha) experienced moderate levels of damage.

FOREST DISEASES

Armillaria root rot, *Armillaria ostoyae* (Romagn.) Herink



This disease is caused by a group of Armillaria fungi that affect both coniferous and deciduous trees throughout Canada. *Armillaria ostoyae* is the most common species to affect trees in Ontario and was noted throughout Southern Region in 2007. In Aylmer and Guelph districts, evidence of fruiting bodies (Figure 6.14) with corresponding rhizomorphs (brown-to-black, shoe-string-like structures found under the bark and soils of affected areas) were recorded in oak (Quercus spp.) and red pine stands. Evaluations in red pine stands in Pembroke and Kemptville districts revealed a 1-2% annual mortality rate in the first several years after infection. This can be expected until the stand achieves total crown closure.

Figure 6.14 Fruiting body of Armillaria root rot on infected red pine (photo by P. Hodge)

Pine needle rust, *Coleosporium asterum* (Dietel) Syd. & P. Syd.

Low infection levels occurred on jack pine regeneration in plantations in Pembroke and Kemptville districts.

White pine blister rust, *Cronartium ribicola* J.C. Fisch.

Stem infections of this introduced pest on eastern white pine were recorded in Guelph and Midhurst districts. Five immature eastern white pine at a campground near Thamesford, Guelph District, showed signs of infection by white pine blister rust in early June. In this same area, approximately 20 immature trees were removed due to premature mortality from this disease. Two locations in the south end of Grey County, Midhurst District also showed various degrees of stem infections.

Tar spot needle cast, *Davisomycella ampla (Davis)* Darker

Severe infection of tar spot needle cast occurred in a small area of an experimental jack pine plantation at the Petawawa Research Forest, Pembroke District. Moderate levels of damage were also reported in sapling sized trees in a plantation in Killaloe, Hagarty and Richards Township, Pembroke District and in White Township, Algonquin Park.

Ash anthracnose, *Discula fraxinea* (Peck) **Redlin & Stack**, *Apiognomonia errabunda* (Roberge) Höhn

Figure 6.15 Tree showing symptoms of ash anthracnose in Midhurst District (photo by H. Evans)

Throughout Southern Region, two species of fungi have been identified as the causal agents of this foliar disease. In Peterborough and Bancroft districts, both species were detected as a sudden leaf drop occurred during high temperatures in late May. These same symptoms recurred several days later causing moderate levels of foliar infection to the lower portion on the crown.

Ash anthracnose caused by *Discula fraxinea* was widely reported throughout Aurora, Midhurst, Guelph and Aylmer districts. The disease was recorded on scattered trees with no apparent pattern of distribution. In late May and early June, just after leaf flush, trees began to display symptoms of attack (Figure 6.15). In most instances the heaviest damage was confined to the lower and mid-crown of the affected trees. Damage was especially heavy along urban and rural roadsides.

Coral spot, *Nectria cinnabarina* (Tode:Fr.) Fr.

While this fungus is generally considered a weak parasite, it can become very aggressive and kill twigs and branches of trees under stress. This fungus has affected Manitoba maple throughout Peterborough District, since a late-season sudden freeze in 2005 made them susceptible to infection. The disease has caused appreciable damage to 40-60 percent of the entire crown of some trees.

Diplodia tip blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton

This commonly encountered blight can be found throughout Southern Region of Ontario and is often found in urban areas on ornamental Austrian pine (*Pinus nigra* Arnold) and Scots pine, as well as in more forested areas on jack pine and red pine. Throughout Aylmer District, both red and Austrian pine lining country roadsides and city streets were recorded with light damage caused by this disease.

A very high incidence of diplodia tip blight occurred on red pine regeneration under semi-mature trees at the Petawawa Research Forest, Pembroke District.

FOREST ABIOTIC EVENTS

Frost Damage

Late spring frost damage in 2007 occurred on red oak in Springwater Township, Simcoe County, Midhurst District. The lower crowns of trees were damaged by a layer of low lying cold air which occurred just after leaf flush in late May. A second flush of foliage developed after this event.

Hail Damage

Following a severe thunderstorm on May 15th of 2007, hail damage was reported in an area south of Caledon Village, in the Town of Caledon, Peel Region in the Aurora District. Both hardwoods and conifers were affected. Visible damage was mapped in an area that totalled 732 ha (Figure 6.16).

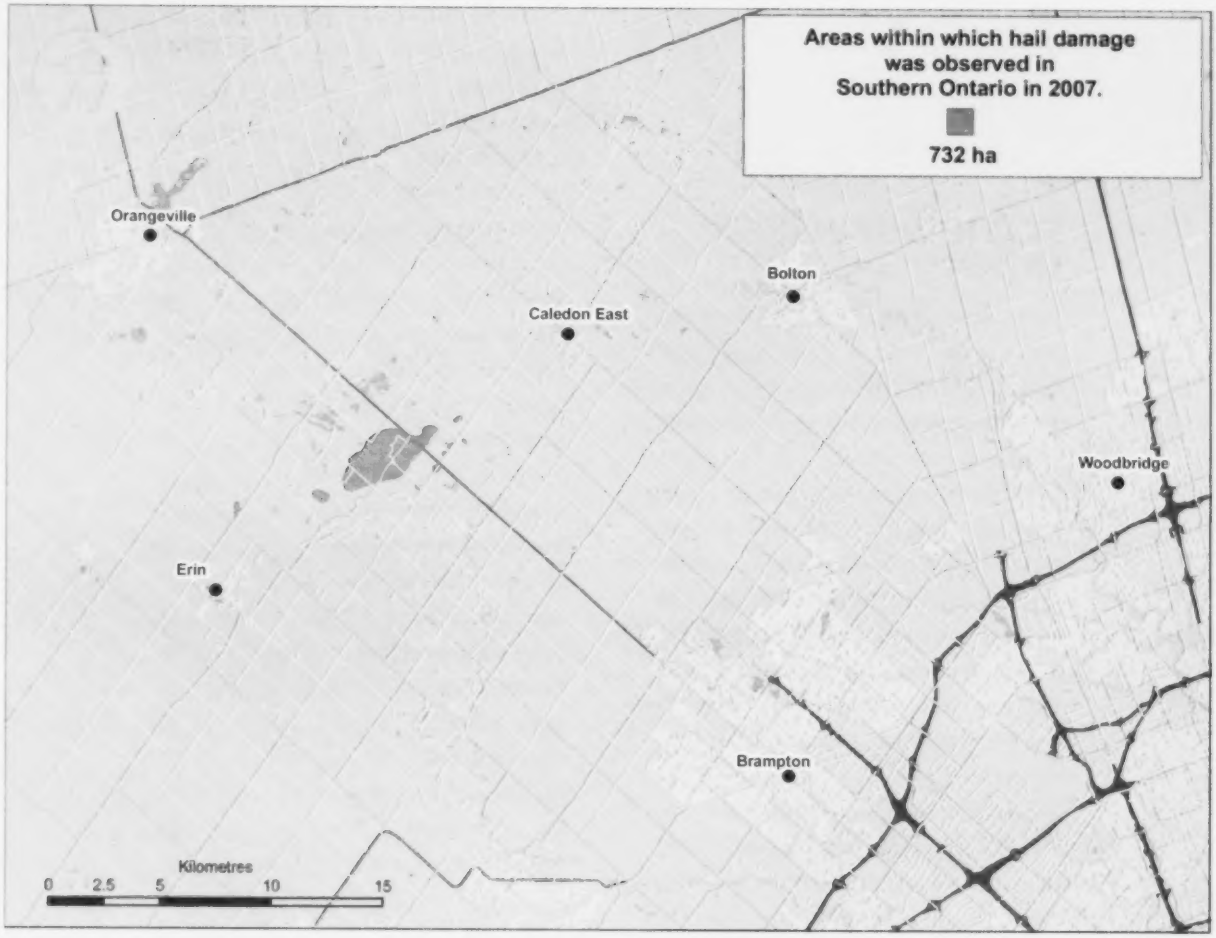


Figure 6.16 Areas-within-which hail damage was observed in southern Ontario, 2007

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